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
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
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
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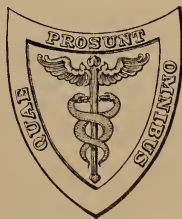
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## TO READERS AND CORRESPONDENTS.

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The following works have been received for review :

Medical Electricity : A Practical Treatise on the Applications of Electricity to Medicine and Surgery. By ROBERTS BARTHOLOW, A.M., M.D., LL.D., Professor of Materia Medica, General Therapeutics, and Hygiene, in the Jefferson Medical College of Philadelphia, etc. Third edition, enlarged and improved. Philadelphia : Lea Brothers & Co., 1887.

The Practitioner's Handbook of Treatment ; or, the Principles of Therapeutics. By J. MILNER FOTHERGILL, M.D., Physician to the City of London Hospital for Diseases of the Chest, Victoria Park, etc. Third edition. Philadelphia : Lea Brothers & Co., 1887.

The Year-Book of Treatment for 1886. Philadelphia : Lea Brothers & Co., 1886.

The Nursing and Care of the Nervous and the Insane. By CHARLES K. MILLS, M.D., Professor of Diseases of the Mind and Nervous System in the Philadelphia Polyclinic. Philadelphia : J. B. Lippincott Co., 1887.

Maternity, Infancy, Childhood. Hygiene of Pregnancy ; Nursing and Training of Infants ; The Care of Children in Health and Disease. By JOHN M. KEATING, M.D., Visiting Obstetrician, and Lecturer on the Diseases of Women and Children, Philadelphia Hospital. Philadelphia : J. B. Lippincott Co., 1887.

Sphygmography and Cardiography. Physiological and Clinical. By ALONZO T. KEYT, M.D. Edited by ASA B. ISHAM, M.D., and M. H. KEYT, M.D. New York : G. P. Putnam's Sons, 1887.

The Diseases of the Ear, and their Treatment. By ARTHUR HARTMAN, M.D. Berlin. Translated from the third German edition by JAMES ERSKINE, M.A., M.B., Surgeon for Diseases of the Ear to Anderson's College Dispensary, Glasgow, etc. New York : G. P. Putnam's Sons, 1887.

Anatomy, Descriptive and Topographical, in 625 illustrations. By CARL HEITZMANN, M.D. English edition, by LOUIS HEITZMANN, M.D. New York : J. H. Vail & Co., 1887.

Agriculture in some of its Relations with Chemistry. By F. H. STORER, S.B., A.M., Professor of Agricultural Chemistry in Harvard University. In two volumes. New York : Charles Scribner's Sons, 1887.

Dermatitis Venenata : An Account of the Action of External Irritants upon the Skin. By JAMES C. WHITE, M.D., Professor of Dermatology, Harvard University. Boston : Cupples & Hurd, 1887.

Dr. F. Beilstein's Lessons in Qualitative Chemical Analysis, Arranged on the Basis of the Fifth German edition. With copious additions, including chapters on Chemical Manipulations, Analysis of Organic Substances, and Lessons in Volumetric Analysis. By CHARLES O. CURTMAN, M.D., Professor of Chemistry in the Missouri Medical College, and in St. Louis College of Pharmacy. Second edition. St. Louis, Mo., 1886.

Physiological Laboratory. Harvard Medical School, Boston. Collected Papers, 1880-1886.

Public Health. The Lomb Prize Essays award made at the Thirteenth Annual Meeting of the American Public Health Association, Washington, D. C., December 10, 1885. With an Appendix. Second edition. Concord, N. H., 1886.

American Public Health Association, Lomb Prize Essays. Healthy Homes and Foods for the Working Classes. By VICTOR C. VAUGHAN, M.D., Ph.D., Professor in University of Michigan. Concord, N. H., 1886.

Elementary Microscopical Technology. A Manual for Students of Microscopy. In three parts. Part I. The Technical History of a Slide from the Crude Materials to the Finished Mount. By FRANK L. JAMES, Ph.D., M.D., President of St. Louis Society of Microscopists. St. Louis, 1887.

Dose and Price Labels of all the Drugs and Preparations of the Pharmacopœia of 1880. Together with Many Unofficial Articles that are frequently called for as Medicines or used in the Arts. For the use of Pharmacists, Physicians, and Students. Second edition. By C. L. LOCHMAN. Philadelphia, 1887.

Earth as a Topical Application in Surgery. By ADDINELL HEWSON, M.D. Second edition. Philadelphia: The Medical Register, 1887.

The Hygiene of the Vocal Organs. A Practical Handbook for Singers and Speakers. By MORELL MACKENZIE, M.D. Lond., Consulting Physician to the Hospital for Diseases of the Throat. Third edition. London: Macmillan & Co., 1887.

A Text-book of Pathological Anatomy and Pathogenesis. By ERNST ZIEGLER, Professor of Pathological Anatomy in University of Tübingen. Translated and Edited for English students by DONALD MACALISTER, M.D., F.R.C.P. Part II. London and New York: Macmillan & Co., 1886.

On the Causation of Club-foot. By ROBERT WILLIAM PARKER, Surgeon to the East London Children's Hospital, etc. London, 1887.

Litholapaxy in Male Children and Male Adults. By Surgeon-Major D. F. KEEGAN, M.D. Dub., Bengal Medical Service, Residency Surgeon, Indore, Central India. London, 1887.

Hip Disease in Childhood. With special reference to its Treatment by Excision. By G. A. WRIGHT, B.A., M.B. Oxon., F.R.C.S. Eng., Assistant Surgeon to the Manchester Royal Infirmary. London: Longmans, Green & Co., 1887.

Congenital Club-foot; its Nature and Treatment, with especial reference to the Subcutaneous Division of the Tarsal Ligaments. By ROBERT WILLIAM PARKER, Surgeon to the East London Hospital for Children, and to Grosvenor Hospital for Women and Children. London: H. K. Lewis, 1887.

The Royal London Ophthalmic Hospital Reports. Edited by R. MARCUS GUNN, M.D., F.R.C.S. Vol. XI. Part III. January, 1887. London.

The Middlesex Hospital Reports of the Medical, Surgical, and Pathological Registrars for the year 1885. London: H. K. Lewis, 1887.

Transactions of the Obstetrical Society of London. Vol. XXVIII. for the year 1886. Part IV. for October, November, and December. London, 1887.

Hygiène des Maternités, Resultats de huit armées d'Observations à la Maternité de Pellegrin (Bordeaux). Par DR. ORÉ, Professeur à la Faculté de Médecine, etc. Paris: J. B. Baillière et Fils, 1887.

Hysterics et Traumatisme Paralysies Contractures Arthralgies Hystero Traumatiques. Par le DR. PAUL BERBEZ. Paris: A Delahaye et Lecrosnier, 1887.

L'Amputation du Membre supérieur dans la Contiguïté du Tronc (Amputation Interscapulo-Thoracique). Par PAUL BERGER, Chirurgien de l'Hôpital Tenon. Paris: G. Masson, 1887.

M. Pasteur et La Rage. Par DR. LUTAUD, Rédacteur en Chef du Journal de Médecine de Paris. Paris: J. Lévy, 1887.

De l'Endométrite et de son Traitement. Par J. A. DOLÉRIS. Paris, 1887.

Hémorrhagies Utérides, par le Docteur Sneguireff; édition Française; redigée par M. H. VARNIER, Interne des Hôpitaux de Paris, sous la direction de M. le Docteur PINARD, Professeur Agrégé à la Faculté de Paris. Paris: G. Steinheil, 1886.

Handbuch der allgemeinen und speciellen Arzneiverordnungslehre. Auf Grundlage der neuesten Pharmacopœen bearbeitet. Von DR. C. A. EWALD, Professor an der kgl. Universität in Berlin. Elfte neu umgearbeitete und vermehrte Auflage. Berlin: August Hirschwald, 1887.

Die Gesundheitspflege in der Mittelschule. Von DR. LEO BURGERSTEIN in Wien. Wien: Alfred Holder, 1887.

The Influence of Maternal Impressions on the Fœtus. By FORDYCE BARKER, M.D., LL.D. New York, 1887.

Annual Address delivered before the American Academy of Medicine at Pittsburg, Pa., October 12, 1886. By R. S. SUTTON, A.M., M.D.

Persistent Pain after Abdominal Section. By JAMES B. HUNTER, M.D. New York, 1887.

Operations for Phimosia as a Means of Cure. Relief of some Nervous and other Symptoms. By G. L. MAGRUDER, M.D. Chicago, 1887.

The Uses of Massage in Medical Practice. Tracts on Massage translated from the German of Reibmayr, with Notes. By BENJAMIN LEE, A.M., M.D., Ph.D. Philadelphia, 1887.

Forensic Surgery. Wm. Zuppan vs. Wm. Dickinson, M.D. Verdict for Defendant. John D. Johnston, Esq., Counsel.

A Novel System of Operating for the Correction of the Deflected Septum by means of an Electric Motor Nasal Drill and an original Spray-producing device. With illustrative cases. By WM. CHAPMAN JARVIS, M.D. New York, 1887.

Evacuant Medication. Cathartics and Emetics. By HENRY M. FIELD, M.D. Philadelphia, 1887.

Malarial Hemorrhage. Written by request of the Medical Society of Virginia. By OTIS FREDERICK MANSON, M.D., of Richmond, Va.

Some Observations upon the Modern Treatment of Urethritis. (Read by invitation before the New York

Dermatological Society.) By GEORGE E. BREWER, M.D., Assistant Surgeon to the Outdoor Department of Roosevelt Hospital. New York, 1887.

Researches into the Etiology of Dengue. By J. W. McLAUGHLIN, M.D., of Austin, Texas. Chicago, 1886.

Periostitis. By N. SENN, M.D., Professor of the Principles and Practice of Surgery and Clinical Surgery. Milwaukee, 1886.

The Antiseptic Treatment of Summer Diarrhoea. By L. EMMETT HOLT, A.M., M.D., Attending Physician to the New York Infant Asylum.

Abuse of Alcoholics by the Healthy. By STANFORD C. CHAILLÉ, A.M., M.D. Concord, 1886.

Iliac Phlegmons. Some Considerations of Anatomical and Surgical Interest. By RUDOLPH MATAS, M.D., 1886.

The Doctorate Address delivered at the Semi-centennial Anniversary of the University of Louisville, Medical Department. By DAVID W. YANDELL, M.D. March 2, 1887.

Dermatological Notes. By J. CLARK McGUIRE, M.D., Dermatologist, Louisville City Hospital.

Address on the Duties and Conduct of Nurses in Private Nursing. By WM. L. RICHARDSON, M.D., Visiting Physician of the Massachusetts General Hospital. Boston, 1887.

The Question of Hemorrhage following Uvulotomy. By ETHELBERG CARROLL MORGAN, A.B., M.D., Washington, D. C., First Vice-President of the American Laryngological Association. New York, 1886.

A Contribution to the Study of the Operation of Shortening the Round Ligaments: Alexander's Operation. By THOMAS A. ASHBY, M.D. Baltimore, 1887.

Report of the Committee on Disinfectants, presented at the Fourteenth Annual Meeting of the American Public Health Association, held at Toronto, Canada, October 5-8, 1886. Concord, N. H., 1887.

Report of the Special Committee (appointed December 11, 1885) on the Disinfection of Rags. Presented at the Fourteenth Annual Meeting of the American Public Health Association, Toronto, Canada, October, 1886. Concord, N. H., 1887.

Maternal Impressions. Discussion on Dr. Barker's Essay. By SAMUEL C. BUSEY, M.D. Washington, D. C., 1887.

A New Explanation of the Renal Troubles, Eclampsia, and other Pathological Phenomena of Pregnancy and Labor. By A. F. A. KING, M.D. New York, 1887.

Thomson's Disease. Myotonia Congenita. By DR. GEO. W. JACOBY. New York, 1887.

Transplantation of a Rabbit's Eye into the Human Orbit. By CHARLES H. MAY, M.D. New York, 1887.

Practical Examples in Prescription Writing. By CHARLES H. MAY, M.D. New York, 1887.

Congenital Hemophilia, with the History of a Remarkable Case. By EDWARD C. WENDT, M.D., February 19, 1887.

Some Considerations concerning Cancer of the Uterus, especially its Palliative Treatment in its later stages. By ANDREW F. CURRIER, M.D. New York, 1887.

Uterine Fibroids and other Pelvic Tumors; their Therapeutic Treatment and Conduct to the Menopause. By HENRY FRAZER CAMPBELL, M.D. 1887.

The Curability of Epilepsy and Epileptoid Affections by Galvanism and the Phosphated and Arsenided Bromides. January, 1887.

New Treatment of the Affections of the Respiratory Organs and of Blood Poison by Rectal Injections of Gases, after the Method of Dr. Bergeon. By DR. V. MOREL. Translated from the French by L. E. HOLMAN. Philadelphia: James W. Queen & Co.

Removal of the Uterine Appendages. Nine Consecutive Cases. By MARY A. DIXON JONES, M.D. New York, 1886.

Infants. Their Chronological Progress. By PROF. STANFORD E. CHAILLÉ, M.D., Tulane University of Louisiana.

Granular Conjunctivitis with and without Pannus. By W. CHEATHAM, M.D.

Proceedings and Addresses at a Sanitary Convention held at Big Rapids, Michigan, November 18 and 19, 1886, under the direction of a Committee of the State Board of Health and a Committee of Citizens of Big Rapids. Two books.

Report upon the Births, Marriages, and Deaths in the State of Rhode Island for the Year 1885. Prepared by CHARLES H. FISHER, M.D., State Registrar of Vital Statistics. Providence, 1886.

The Biennial Report of the State Board of Health of the State of West Virginia, for the years 1885 and 1886. Charleston, 1886.

The Report of the State Board of Health of Minnesota, 1884-1886, with Appendix containing Special Reports. Red Wing, 1887.

Report of the Board of Health for the City of Reading for the year 1886.

Report of the Commission for Better Provision of Insane Criminals. New York, February 16, 1886.

Annual Report of the Medical Superintendent of the State Asylum for Insane Criminals. Auburn, September, 30, 1886.



Annual Report of the Trustees of the Massachusetts General Hospital and McLean Asylum, 1886. Printed at the expense of the Bowditch History Fund. Boston, 1887.

Annual Report of the Cincinnati Hospital to the Mayor of Cincinnati for the fiscal year ending December 30, 1886. H. M. Jones, Superintendent. Cincinnati, 1887.

Transactions of the Pathological Society of Philadelphia. Vol. XII. Containing the Report of the Proceedings from September, 1883, to July, 1885. Edited by W. E. HUGHES, M.D., Medical Registrar of the University Hospital. Philadelphia, 1886.

Transactions of the Massachusetts Medico-Legal Society. Vol. I. No. 9, 1886. Boston, 1886.

Proceedings of the Academy of Natural Sciences of Philadelphia. Part III. October-December, 1886. Philadelphia, 1887.

Transactions of the Seventeenth Annual Session of the Medical Society of Virginia, held at Fredricksburg, Va., September 26, 27, 28, 1886. Richmond, 1886.

The following Journals have been received in exchange :

Albany Medical Annals.	Medical Record.
American Journal of Insanity.	Mississippi Valley Medical Monthly.
American Journal of Obstetrics.	Nashville Journal of Medicine and Surgery.
American Journal of Pharmacy.	New Orleans Medical and Surgical Journal.
American Journal of Science.	New York Medical Journal.
American Lancet.	North Carolina Medical Journal.
American Medical Digest.	Northwestern Lancet.
American Practitioner and News.	Obstetric Gazette.
Annals of Surgery.	Pacific Medical and Surgical Journal.
Archives of Ophthalmology.	Peoria Medical Monthly.
Archives of Otolary.	Philadelphia Medical Times.
Atlanta Medical and Surgical Journal.	Physician and Surgeon.
Boston Medical and Surgical Journal.	Pittsburg Medical Review.
Buffalo Medical and Surgical Journal.	Polyclinic.
Chicago Medical Journal and Examiner.	Popular Science Monthly.
Chicago Medical Standard.	Progress.
Cincinnati Lancet and Clinic.	Quarterly Compendium of Medical Science.
Cincinnati Medical News.	Quarterly Journal of Inebriety.
Cleveland Medical Gazette.	Sanitarian.
College and Clinical Record.	Sanitary Engineer.
Columbus Medical Journal.	Sanitary News.
Daniels' Medical Journal.	Southern California Practitioner
Dental Cosmos.	Southern Medical Record.
Denver Medical Times.	Southern Practitioner.
Druggist's Circular.	St. Joseph Medical Herald.
Ephemeris.	St. Louis Courier of Medicine.
Gaillard's Medical Journal.	St. Louis Medical and Surgical Journal.
Journal of the American Medical Association.	Texas Courier of Medicine.
Journal of the Franklin Institute.	Therapeutic Gazette.
Journal of Nervous and Mental Diseases.	Virginia Medical Monthly.
Kansas City Medical Record.	Weekly Medical Review.
Kansas City Medical Index.	Western Medical Reporter.
Maryland Medical Journal.	Canada Lancet.
Medical Age.	Canada Medical Record.
Medical Herald.	Canada Medical and Surgical Journal.
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SARCOMA OF THE FEMALE BREAST;  
BASED UPON A STUDY OF ONE HUNDRED AND FIFTY-SIX CASES.

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IN my *Treatise on Tumors of the Mammary Gland*, published in 1880, may be found a chapter on sarcoma, in which the general pathology and life-history of the affection are deduced from an analysis of sixty cases confirmed by microscopical examination. This account remains up to the present time the most trustworthy description of this neoplasm with which I am acquainted; and it constitutes the only one in which an attempt has been made upon anything approaching an extended scale to determine the relations which exist between its minute features and its clinical characters. Feeling that many points were still obscure, I have, during the past seven years, kept a careful record of my own cases, and noted those reported by other surgeons, so that my collection now embraces one hundred and fifty-six cases,<sup>1</sup> including nineteen of my own, a critical examination of which affords the data for this paper.

The varieties and subvarieties of sarcoma of the female mamma are the same as those met with in other organs. The principal ones—the spindle-celled, round-celled, and giant-celled—are determined by the

<sup>1</sup> I have to express my thanks to Dr. Sands, Dr. Markoe, and Dr. Bull, of New York, and Mr. Bryant, of London, for unpublished cases from their practice, and to Mr. Henry Morris, of London, Mr. Humphry, of Cambridge, Mr. Banks, of Liverpool, Mr. Whitson, of Glasgow, and Mr. Page, of Newcastle-on-Tyne, for the final histories of their recorded cases.

prevailing form of the cells, and the first two are further separated, in accordance with the dimensions of the cells, into the small-celled and large-celled. The subvarieties are constituted by the nature or arrangement of the intercellular substance; by various transformations or combinations with other neoplastic tissues; by the presence or absence of duct or retention cysts; and by the persistence of glandular elements. Hence the modified forms of sarcoma are the fibrous, lymphoid, alveolar, myxomatous, cartilaginous, osteoid, calcifying, melanotic, telangiectatic, hemorrhagic, cystoid, solid, cystic, and adenoid.

Of the varieties of sarcoma, the spindle-celled, which include the fibrous, constitute 68 per cent., the round-celled 27 per cent., and the giant-celled 5 per cent. of all cases.<sup>1</sup> Of the subdivisions, 50 per cent. are cystic, the term including the barren and proliferous cysts; 50 per cent. are solid or noncystic; 33 per cent. are adenoid, the glandular structures persisting principally in the spindle-celled growths; 12.80 per cent. are myxomatous, the combination being almost peculiar to the spindle-celled and cystic tumors; 7.69 per cent. are telangiectatic and hemorrhagic; 7 per cent. are cystoid, or the seat of softening cysts; 2.56 per cent. are osteoid; 2.56 per cent. are calcifying; 1.21 per cent. are cartilaginous; 1.92 per cent. are alveolar; 1.21 per cent. are lymphoid; and 1.21 per cent. are melanotic or pigmented. It is interesting to note that in the ten examples of calcification, chondrification, and ossification, the tumors were spindle-celled in seven, and cystic in five. In the three cases of alveolar sarcoma the tumor was round-celled in two, and giant-celled in one; while both of the pigmented growths were alveolar and round-celled.

Like the other encapsuled neoplasms of the mamma, circumscribed sarcomata are ovoid, rounded, or spherical, lobed or bossed, and seldom smooth and uniform, the surface irregularities being most marked in the cystic variety. As a rule, they are unattached to the gland, but push it aside, compress, and flatten it, or cause it to atrophy, although they are, in rare instances, united to it by a pedicle. Their consistence varies with their minute structure and degenerations, the pure spindle-celled and giant-celled tumors being firm, like fibromata, while the round-celled are soft and elastic. The spindle-celled, however, are soft in about one-third of all examples, when they will be found to be composed of small fusiform cells, or to have undergone myxomatous or fatty transformation, or to be the seat of interstitial hemorrhage. The round-celled are hard in about one-sixth of all cases, when they will usually be found to be rich in

<sup>1</sup> Of the nineteen cases that have come under my personal observation, thirteen were spindle-celled and six round-celled. Of the former, five were firm, small adenoid growths; one was a telangiectatic and myxomatous, and one a myxomatous medullary sarcoma; six were firm cystic, and in two of these the cysts were filled with vegetations. Of the six round-celled, one was lymphoid; one was a myxomatous cystic medullary growth; two were proliferous cystic; and one of these was medullary, and two were cystoid medullary tumors.

fibrous intercellular substance. In one of the best illustrations of round-celled tumors that I have ever seen, the tissue was dense, so that they are by no means synonymous with soft, medullary, or encephaloid sarcomata, although they are usually much softer than the spindle-celled variety, since they are peculiarly rich in cells and bloodvessels, and since their intercellular substance is usually mucoid. The spindle-celled growths sometimes creak or cry under the knife, in which event they come under the category of fibrous sarcomata, from the large admixture of fibrous tissue. Their consistence varies, moreover, with their stage of development. If they are solid, it is entirely or almost uniform; while they are soft and elastic, or soft and fluctuating at some points, and especially at the larger bosses, and hard at others, when they are the seat of cysts occupied by fluid, or solid contents, or by both. In about one-fourth of the cystic growths, however, the tumor is firm throughout, in consequence of the cysts being so deeply seated as to elude detection by manipulation.

On section the spindle-celled tumors are usually smooth, succulent, and glistening, and of a white or grayish-white color, particularly if they are poor in vessels, the tint being rosaceous-white or rosaceous-gray when their vascular supply is larger. The round-celled tumors, on the other hand, are rarely pure white, but, from their relatively greater vascularity, reddish-white, reddish-yellow, or reddish-gray, the hue being not infrequently comparable to that of the foetal brain. When they are highly vascular the rosaceous tint is very marked, or they are pervaded by macroscopic vessels; or dotted with minute spots of ecchymosis, or patches, or streaks of bright red or brown, or various intermediate shades of pigmentation. In not a few instances the soft brain-like tissue is so extensively interspersed with clots of blood, and with tomentous cysts containing blood, that the term hematoid or hemorrhagic sarcoma is not inappropriately applied to them, or the term fungus hematodes when they protrude through the skin. A pronounced yellowish color indicates fatty metamorphosis, which may pervade almost the entire tumor, or be confined to limited areas or to the vegetations alone, while the remainder is white or gray, thereby imparting to it a mottled aspect. A yellowish tint also denotes myxomatous changes, so that, as in the former instance, the mass of the growth may be white, or rosaceous-white, or rosaceous-gray, and the vegetations be yellow. On the whole, however, gelatinous spots dotting the surface of the section are the best characteristic of this change. Now and then, or when great vascularity and the fatty and myxomatous degenerations are combined, there will be areas of yellow and red, and spots of brown pigmentation, along with gelatinous dots. In point of fact, the color is so variable that it is extremely difficult to give an intelligible description of it. It need scarcely be added that melanotic sarcomata are pervaded by areas of



dark brown or black pigmentation. The cut surfaces of many of the largest specimens have also a lobed appearance from the close packing of the vegetations in the enlarged ducts which play the part of capsules.

The gross characters of the smaller tumors, which correspond to the adenoid sarcomata of Billroth, and which do not grow larger than a walnut in seven or eight months, are worthy of notice, as they differ from fibromata of the same dimensions in several particulars that are useful in establishing a differential diagnosis. Thus, of the five specimens of adenoid spindle-celled growths which I have extirpated, all were lobulated, firm, elastic, adherent to the gland, grayish-white in color, and tough on section. The fibromata, on the other hand, were hard, merely nodular, less adherent to the mamma, white, and more compact and tough on section. Under the microscope, the glandular elements were undergoing obliteration to a greater extent in the former than in the latter.

Inflammation and suppuration of mammary sarcoma are infrequent, but ulceration of the overlying tissues is so common that it occurred in twenty-nine, or 18.59 per cent., of the one hundred and fifty-six cases that I have collated, a proportion which is more than double that met with in fibroma. As is witnessed in the latter tumor, the ulceration appears to be the result rather of inflammation and gangrene, or merely rupture, of the attenuated skin, than of its infiltration by sarcomatous cells; but in one case it depended upon exploratory puncture. In some examples it is, doubtless, due to invasion of the skin, but only one case, that of a crater-like ulcer, appears to have originated in this way. In 10 per cent. of the cases the ulcer presents itself in the form of a sloughing patch. Fungous protrusion almost invariably follows the perforation of the integuments, although in a remarkable instance recorded by Ashhurst,<sup>1</sup> the recurrent growth of which I exhibited at the Pathological Society, the ulcer subsequently healed. The protruding mass, which is usually an intracystic growth, varies in size from a hazelnut to three, four, and even five inches in diameter, and exhales a sanguinolent and fetid discharge, which may become more or less purulent from inflammation induced by exposure and friction. It is not, however, very prone to free hemorrhage or sloughing. The ulcer itself is usually circular, and the surrounding skin is not only, as a rule, free from discoloration, but it is also unattached to the fungus, and everted, or rather elevated, on its sides. Now and then there are several ulcers, separated by bridges of sound tissue. From a diagnostic standpoint, it is worthy of notice that ulceration occurred in 7.69 per cent. of solid sarcomata, against 18.76 per cent. of cystic sarcomata, and that it was met with in 25 per

<sup>1</sup> Trans. Path. Soc. Phila., vol. v. p. 230.

cent. of the giant-celled, 23.58 per cent. of the round-celled, and 17.58 per cent. of the spindle-celled tumors.

Sarcomata of the breast are generally solitary, since I find of one hundred and fifty-six cases that only ten were multiple, several growths existing in one gland in seven and in both glands in two, while in the tenth instance four tumors were present in one breast, and one tumor was found in its fellow. Their most common seat is in the vicinity of the nipple, and, when they arise from the circumference of the organ, they are usually found at its upper and outer quadrant. When of central origin they are, for the most part, cystic; while they are usually solid when they start from outlying lobules. In either event they evince a marked disposition to extend beyond the limits of their capsules, those of central origin gradually invading the entire gland, and the surrounding soft parts, while the peripheral ones not only infect the latter structures, but also finally implicate the entire breast. As a rule they give rise to broadly based hemispherical tumors, but they are now and then pedunculated.

They occur as early as the ninth and as late as the seventy-fifth year, the average age of their first observation being 40.6 years. Of 148 cases in which the age is recorded,

1 appeared	at	9 years.
14	"	between 10 and 19 years.
16	"	20 " 29 "
40	"	30 " 39 "
39	"	40 " 49 "
23	"	50 " 59 "
14	"	60 " 69 "
1	"	at 75 years.

Of the entire number only 4, or 2.70 per cent., occurred before the sixteenth year, or during the developmental state of the mamma; 67, or 45.27 per cent., appeared between the sixteenth and fortieth years, or at a period when the breast and genitalia are functionally most active; and 77, or 52.02 per cent., after the fortieth year, or during the period of their functional decline. Spindle-celled tumors develop earlier in life than the giant-celled and round-celled, since the average age at which they were noticed was 36 years and 7 months, against 47 years and 3 months for the giant-celled, and 48 years for the round-celled. Unlike cystic and solid fibromata, cystic sarcomata appear at an earlier age than solid sarcomata, the average for the cystic being 38 years and 5 months, against 43 years for the solid variety. Hence it may be said that spindle-celled and cystic sarcomata are metaplasias of the functionally perfect mamma, and round-celled, giant-celled, and solid sarcomata are metaplasias of the declining gland. In point of fact, the fifteen sarcomata occurring before the age of twenty were spindle-celled in fourteen.

Thirty-three of the patients were single and fifty-seven were married when the tumor was first noticed, while the social condition is not noted in the remainder. Of the married women forty were multiparous, six had one child, and eight were barren; while the question of children is not stated in three. In two cases the disease showed itself during pregnancy, and in four soon after parturition. Of thirty-eight subjects in which the menstrual function is recorded, all were regular save one, who suffered from amenorrhœa. In seventeen instances, or one in every nine and one-third, injury was assigned as the cause of the tumor; in one it developed at the site of an abscess; in one it was preceded by psoriasis of the nipple; while in none was it inherited. These facts show that the etiology of sarcomata is most obscure, since their development is rarely traceable to injury or disease, and is not influenced by hereditary predisposition, while the social state and menstrual irregularities or arrest are surely unimportant agents in their production.

The increase of sarcomata is more rapid than that of the other connective tissue neoplasms, but it is liable to great diversity, being independent of the age of the subject, and influenced by their structure, by their degenerations, and by the absence or presence of cysts. Of the solid sarcomata I have met with six examples which varied from one to two inches in diameter in five, six, seven, and eight months; and, even at the end of two or three years, they may not be larger than an apricot<sup>1</sup> or a turkey's egg,<sup>2</sup> although they may, in their pure state, attain the volume of an adult head in four months,<sup>3</sup> or a circumference of twenty-five inches and a weight of four pounds and two-thirds in nine months.<sup>4</sup> When they are the seat of myxomatous degeneration or of softening cysts, they may weigh four pounds and twelve ounces,<sup>5</sup> or measure twenty-three inches in circumference and weigh six pounds, in four months.<sup>6</sup> Of the cystic, as of the solid, variety, I have seen examples in which it did not exceed a diameter of two inches in five and eight months; while it is rarely larger than a fist in one year. In exceptional instances, however, it may attain the volume of a double fist in three months,<sup>7</sup> or a weight of upward of ten pounds in the same number of months,<sup>8</sup> or a circumference of thirty-one inches and a weight of twelve pounds in one year.<sup>9</sup> As an evidence of its unequal rate of progress, we may state that it may require eighteen months,<sup>10</sup> five years,<sup>11</sup> eighteen

<sup>1</sup> Reverdin: *Bull. de la Soc. Anat.*, t. xlii. p. 708, and t. xlv. p. 285.

<sup>2</sup> Zambianchi: *Ibid.*, t. xli. p. 314.

<sup>3</sup> Billroth: *Chir. Klinik*, Wien, 1869-70, p. 142.

<sup>4</sup> Bryant: *Trans. Path. Soc. London*, vol. xix. p. 387.

<sup>5</sup> Bennett: *Cancerous and Cancroid Growths*, pp. 12 and 256.

<sup>6</sup> Hewson: *Gross's System of Surgery*, 6th ed., vol. ii. p. 974.

<sup>7</sup> Post: *Medical Record*, 1872, p. 112.

<sup>8</sup> Glück: *Langenbeck's Archiv*, Bd. viii. *Jahresbericht*, p. 599.

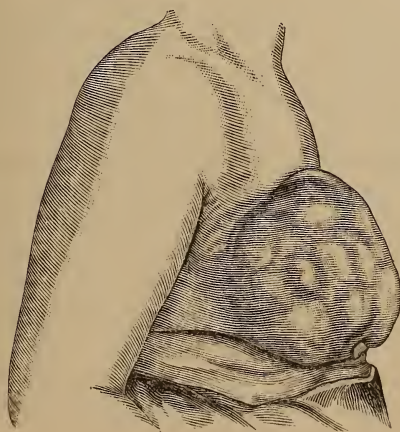
<sup>9</sup> Pitha: *Ibid.*, p. 599.

<sup>10</sup> Hubert: *Bull. de la Soc. Anat.*, t. xlviii. p. 690.

<sup>11</sup> Reverdin: *Ibid.*, t. xlv. p. 281.

years,<sup>1</sup> or forty years<sup>2</sup> to reach the volume of a foetal head, or six years<sup>3</sup> or fifteen years<sup>4</sup> to attain the size of an adult head.

Like the cystic fibromata, sarcomata may remain stationary and of small dimensions for a long time, when, without obvious cause, they suddenly begin to increase, so that a nodule that has required fifteen years to attain the volume of a walnut reaches that of a double fist in three months;<sup>5</sup> or one which has remained the size of an egg for eighteen years, acquires the volume of an adult head in a few months;<sup>6</sup> or one that has been quiescent and of the size of a walnut for twenty-five years, suddenly begins to grow, and measures eighteen inches transversely by fourteen inches and a half vertically in three years;<sup>7</sup> or one that has been a year and a half in acquiring the volume of an egg grows to a circumference of twenty-six inches, and a weight of seven pounds in an additional six months.<sup>8</sup> In such cases rapid accumulation of fluid and solid contents in the dilated ducts may be looked for; or the increase in volume may be due to myxomatous changes and interstitial hemorrhage. Under similar circumstances their progress may be interrupted, of which I recently met with a notable example. On the 11th of November, 1886, I removed a proliferous cystic small spindle-celled tumor from a lady of sixty-five. At the age of twenty-five, she accidentally observed a tumor as large as a chestnut at the inner side of the right nipple. It remained



of that size until the age of sixty-one, when it began to grow, and during the past year had doubled its volume, so that it was larger than a foetal head. Its gross characters are shown in the illustration, and the breast

<sup>1</sup> Pick : Trans. Path. Soc. London, vol. xx. p. 347.

<sup>3</sup> Hubert : Ibid., t. xlvii. p. 389.

<sup>5</sup> Marignac : Bull. de la Soc. Anat., t. lii. p. 428.

<sup>6</sup> Tillaux, quoted by Cordier : Thèse de Paris, 1880, No. 494, p. 16.

<sup>7</sup> Anderson : Trans. Path. Soc. London, vol. xxiii. p. 254.

<sup>8</sup> Marchand : Gaz. des Hôpitaux, 1869, No. 51, p. 196.

<sup>2</sup> A personal case.

<sup>4</sup> Berbèze : Ibid., t. xli. p. 94.



measured seven inches more in circumference than its fellow. Robin<sup>1</sup> has recorded a case in which a vegetating myxomatous spindle-celled tumor remained of the size of a hazelnut for six years, when it grew continuously for four years, and reached the volume of a fist, and then doubled its size in three years and a half, and during the last six months, or fourteen years from its first appearance, attained a weight of nine pounds. Tillaux<sup>2</sup> extirpated a cystic tumor which grew from the size of a filbert to a hen's egg in three years, at which size it remained stationary for four years, when in six months it acquired the volume of an adult head. Although these seven cases were examples of cystic tumors, their peculiar histories countenance the view held by Billroth, Labbé<sup>3</sup> and Coyne,<sup>4</sup> König,<sup>5</sup> Duplay,<sup>6</sup> and myself, that fibroma is frequently metamorphosed into sarcoma through multiplication of its cells and increased vascularization. The opponents of this view of a change of type may urge that a sarcoma may remain latent for many years, when, without obvious cause it begins to grow rapidly; but there is certainly no reason why a fibrous tumor should not serve as the mother tissue of a sarcoma as well as ordinary fibrous tissue. Be this as it may, a long period of quiescence and intermission of growth are not infrequent in sarcoma, and are of diagnostic value when compared with the progress of other neoplasms of the breast. As occurs in fibroma, continuous growth rather indicates freedom from cysts and vegetations, while sudden and rapid increase points to fluid accumulation and intracanalicular vegetations.

The growth of sarcomata might naturally be expected to be connected with menstruation, pregnancy, or lactation, or with conditions which render the mammary gland more vascular; but the influence of an increased flow of blood to the organ, which has been assumed by certain authors, is not confirmed by an analysis of the cases that I have collected. Thus, in only three examples was an increase in bulk witnessed at the menstrual period, while in two the tumor became smaller. In one the rapid growth began during pregnancy, and in two at the menopause.

From these considerations it follows that, while sarcomata constitute the most bulky of the mammary neoplasms,<sup>7</sup> their growth is so capricious that an average rate of increase cannot be assigned to them. On the whole, however, one is justified in concluding that the small-celled,

<sup>1</sup> Journal de l'Anat. et de Phys., t. x. p. 195, and Bull. de la Soc. Anat., t. xlviii. p. 817.

<sup>2</sup> Cordier: Thèse de Paris, 1880, No. 494, p. 7.

<sup>3</sup> Chir. Klinik., Wien, 1871-76, p. 261.

<sup>4</sup> Traité des Tumeurs Bénignes du Sein., pp. 269, 283, and 363.

<sup>5</sup> Lehrbuch der Spec. Chirurgie, 4th ed., Bd. 11, p. 89.

<sup>6</sup> Traité Élément. de Path. Ext., par Follin et Duplay, t. v. p. 628.

<sup>7</sup> In his inaugural dissertation, Ueber Fibro-Adenom der Mamma, Göttingen, 1878, p. 13, Watson narrates a case from the practice of Kremer, in which the tumor weighed twenty-two pounds. Péan, in his Leçons de Clinique Chir., t. ii. p. 90, describes a myxomatous cystic spindle-celled sarcoma which weighed ten kilos, or more than twenty-six pounds, and a similar weight is recorded by Cordier, in his Thèse de Paris, No. 494, 1880, p. 40, from the practice of Tillaux.

the cystic, the myxomatous, and the telangiectatic increase more rapidly than the large-celled, the solid, and the pure tumors.

The active growth of the sarcomata is liable to be attended with marked elevation of the temperature, as was noted in two of my own cases, in one of which Seguin's surface thermometer indicated 100° against 95° for the opposite breast. In two other examples of cystic sarcoma there was an increase in the heat, as roughly estimated by the hand. All of these tumors were highly vascular and composed of small cells, so that elevation of the temperature may be said to be characteristic of telangiectatic and rapidly proliferating growths. Further investigations in this direction may prove useful in determining the differential diagnosis of the connective tissue neoplasms, and should not be neglected.

During their further progress sarcomata continue, as a rule, mobile and free from superficial or deep attachments; the contiguous structures are not invaded by tumor elements; the skin remains natural in color and texture; the subcutaneous veins are not enlarged; the nipple is normal; and the associated lymphatic glands are not contaminated. To these general statements some exceptions must be noted.

α. While it is not uncommon for recurrent tumors to be more or less closely fixed to the pectoral muscle, and through it to the walls of the chest, it is a singular fact that the primary growth is, almost without exception, freely movable, and rarely attached even to the common integument. In a case of spindle-celled tumor recorded by Zambianchi, and it was an example of two growths in the same breast, the outlying tumor developed over the upper costal cartilages to which it adhered, and sent a prolongation into the thorax.<sup>1</sup> In 6 additional instances, the muscles of the chest were involved in 5, and the parammary fat in 1. The tumor was cystoid spindle-celled in 1, cystic spindle-celled in 2, round-celled in 1, osteoid round-celled in 1, and cystic giant-celled in 1. Just how often the skin is invaded is difficult of solution, since in some of the cases of ulceration it was, doubtless, converted into sarcoma tissue, but microscopic data of this fact are wanting. Be this as it may, the skin was adherent in 15 examples, of which 10 were cystic, and 5 solid tumors, the round-celled slightly predominating. If, in addition to the cases of invasion of the muscles, perichondrium, and connective tissue, these 15 cases be regarded as instances of invasion by tumor elements, sarcomata of the breast are to be regarded as locally infectious in 14.19 per cent. of all cases.

β. Although the skin may be stretched and attenuated, and ulcerated,

<sup>1</sup> Ante: Lagrange and Duret (Bull. de Soc. Anat., t. xlviii. p. 516) refer to a case in which, on post-mortem examination of a female who had for many years an enormous sarcoma of the breast, the tumor separated the fibres of the pectoral muscles, passed between two ribs into the cavity of the mediastinum, and penetrated between and compressed the lobes of the lung, without infecting any of these structures.

as I showed in 18.59 per cent. of all examples, it was discolored in only 36, or in 23 per cent., and it is interesting to know that the changes in tint occurred twenty-seven times in the cystic and nine times in solid growths, three of which were the seat of degeneration-cysts, and that the round-celled tumors predominated. In twenty-one the tint was red, in four bluish, in ten violaceous, and in one livid.

γ. The superficial veins were enlarged in 24 instances, or in 15.39 per cent., but only to a slight extent in 2. In 18 the tumor was cystic, and in 6 it was solid, but in the latter it was the seat of extravasation of blood in one, and of mucoid cysts in the second. The spindle-celled growths predominated.

δ. The nipple was retracted or umbilicated in only 5, and these were examples of cystic growths.

ε. Of the 156 cases the lymphatic glands were enlarged, and now and then tender, in 19. In 14 of these the enlargement was associated with the primary growth, but in only 1, a case of alveolar pigmented round-celled sarcoma, were tumor elements detected.<sup>1</sup> In the remaining 5, the glands were extirpated along with recurrent growths, and in 2 of these, one an example of round-celled sarcoma communicated to me by Dr. Markoe, of New York, and the second a case of alveolar giant-celled tumor,<sup>2</sup> were they infected. Hence the glandular enlargement was due to irritative hyperplasia in 16, in 10 of which ulceration of the tumor was present, while they were infected in only 3. This immunity of the glands from contamination is remarkable, and is a valuable sign in the differential diagnosis of malignant mammary growths.

A discharge from the nipple is not met with in the solid tumors, but occurs in one case out of every nine and a half of cystic sarcomata, the proportion being smaller than is met with in cystic fibromata, and is of great value as a symptom of enlargement of the ducts, although it is of itself unimportant in the differential diagnosis. In two instances from the practice of Bryant,<sup>3</sup> the discharge was the first symptom, and preceded the detection of the tumor by three months in one and by two years in the other case. In a third case, recorded by that surgeon,<sup>4</sup> the flow was bloody, and derived from highly vascular vegetations. In the case of Hubert,<sup>5</sup> the tumor augmented in size at each menstrual period, when there was an occasional discharge of a citron-colored liquid. In the examples of Billroth<sup>6</sup> and Winslow,<sup>7</sup> in which the neoplasm developed during pregnancy, there was also a spontaneous escape of a serous fluid; while in those of Lebert<sup>8</sup> and Verneuil,<sup>9</sup> a viscid transparent liquid was expelled by pressure.

<sup>1</sup> Billroth: Die Krankheiten der Brustdrüsen, p. 56.

<sup>2</sup> Ibid., p. 58.

<sup>3</sup> Guy's Hospital Reports, ser. 3, vol. x. p. 115, and ser. 3, vol. xxviii. p. 468.

<sup>4</sup> Ibid., vol. x. p. 120

<sup>5</sup> Bull. de la Soc. Anat., t. xlviii. p. 389.

<sup>6</sup> Chir. Klinik, Wien, 1869 and 1870, p. 142.

<sup>7</sup> Maryland Med. Journ., vol. 12, p. 243.

<sup>8</sup> Physiologie, Pathologique, t. ii. p. 128

<sup>9</sup> Valude: Thèse de Paris, 1885, No. 91, p. 131.



The growth of sarcomata is attended with pain in 35.71 per cent. of all cases. In only 2.67 per cent., however, was attention first called to the tumor by suffering, and, in the remainder, it declared itself later, and varied in character and frequency in accordance with the variety of the sarcoma. Thus, in the solid form it was experienced in only 28 per cent. of the cases, and of these it was lancinating and continuous in 42.85 per cent., of an occasional darting character in 28.57 per cent., and lancinating and continuous only during the rapid increase of the tumor. In the cystic variety, on the other hand, it was felt in 41.93 per cent. of the cases, and in 69.23 per cent. of these it was, as a rule, severe and lancinating, and came on late in the disease, especially during rapid growth, when the tumor became tense through the increase of the contents of the cysts; while it was continuous and lancinating in 11.53 per cent., and slight in 19.23 per cent. In 14.28 per cent. of all cases it was only experienced when ulceration had set in, but ulceration and fungous protrusion provoked suffering in only 35.72 per cent. of all instances, and rarely increased it when it was previously felt. In one instance it was experienced only at the menstrual periods; while in three it was aggravated, and in one diminished, at that period. In only five cases was the growth absolutely tender, although in many examples it was annoying from its weight and bulk, so much so, indeed, in a case recorded by Pick, that the woman repeatedly tapped the cyst with a penknife to rid herself of these features.

During their further progress, as we have already seen, sarcomata may invade their limiting capsules and the neighboring tissues, and finally ulcerate. Without, however, of necessity pursuing this course, their capsules may remain intact, but none the less may they extend to the adjacent structures along the course of the bloodvessels, the adventitia of which is frequently the seat of small-celled proliferation, through which the tissues are converted into "latent zones of infection;" these zones are not appreciable by the naked eye, but serve not only as the points of departure of the recurrences that are so often witnessed after their removal, but also as foci of general infection with the production of deposits in the internal organs. Hence it is that the prognosis of sarcomata is eminently unfavorable, although there is still no little diversity of opinion among practical surgeons and pathologists on this point. Thus, Wilks and Moxon,<sup>1</sup> Cornil and Ranvier,<sup>2</sup> Labbé and Coyne,<sup>3</sup> and Erichsen<sup>4</sup> regard them, and particularly the cystic form, as being comparatively innocent, and only marked by a tendency to local reproduction. Labbé and Coyne and Erichsen deny the possibility of the general dissemination of spindle-celled tumors; and Erichsen,

<sup>1</sup> Lectures on Path. Anatomy, p. 584, 1875.

<sup>2</sup> Manuel d'Histologie Pathologique, p. 1162.

<sup>3</sup> Op. cit., p. 431.

<sup>4</sup> The Science and Art of Surgery, 8th Amer. ed., vol. ii. p. 710.



indeed, advances the doctrine that "the tendency to recurrence will, in most cases, gradually wear itself out, and after several operations have been required at intervals of months, or a year or two, the disease will cease to be reproduced, and a cure will be thus established;" although he adds, that "instances are not wanting in which the tendency to the local reproduction of the sarcoma has been so active that it outran all possibility of complete extirpation, and eventually destroyed the patient." Virchow<sup>1</sup> states that, while sarcoma may recur in loco, "it is a tumor of limited malignity, but fully capable of producing metastases;" and Lücke<sup>2</sup> indorses this view. Birkett,<sup>3</sup> Gross,<sup>4</sup> Ashhurst,<sup>5</sup> Klebs,<sup>6</sup> Billroth,<sup>7</sup> Annandale,<sup>8</sup> Winckel,<sup>9</sup> and Agnew,<sup>10</sup> on the other hand, fully recognize the malignant attributes of sarcomata as denoted by their capability of reproducing themselves, not only in the neighboring tissues, but also in remote parts; and other writers regard their progress as being "much more favorable" than that of mammary carcinoma.

The greatest obscurity exists in regard to the cystic sarcomata, which include the tumors in which the dilated ducts are more or less closely filled with vegetations. This uncertainty is due to the fact that many English and German pathologists and surgeons class cystic adenomata, cystic fibromata, and cystic myxomata under the term cystic sarcoma. Marcus Beck,<sup>11</sup> the latest writer on the subject, indeed, denies the presence of duct cysts in sarcoma.

In 1880 I certainly established the fact that all the varieties of sarcoma of the breast are malignant; and a careful study of 92 of the 156 cases upon which this paper is based, and in which the final reports extend beyond the mere statement of the recovery or death of the patient, confirms this view.

Of the 92 cases only 1 ran a natural course, it being an example of round-celled tumor of both breasts, that proved fatal, with presumed secondary deposits, in seven months from the first appearance of the disease. The remaining 91 were subjected to the knife. Of these, 32 were well for periods which varied between one month and ten years and nine months; 42 were marked by local recurrence; in 8, not only was there regional reproduction, but metastases were found post-mortem; 3 recurred, with unmistakable evidences of general dissemination; 4 were characterized by metastases, and 2 by presumed metastases, without recurrence. In other words, 64.83 per cent. of these cases were endowed

<sup>1</sup> Op. cit., p. 362.

<sup>2</sup> Pitha and Billroth's Hdbch. der Allg. und Spec. Chir., Bd. ii., Abth. i., p. 194.

<sup>3</sup> A System of Surgery, edited by Holmes and Hulke, 3d ed., vol. iii. p. 451.

<sup>4</sup> System of Surgery, 6th ed., vol. ii. p. 973.

<sup>5</sup> Phila. Med. Times, vol. ix. p. 384, 1879.

<sup>6</sup> Op. cit., p. 1118.

<sup>7</sup> Die Krankheiten der Brustdrüsen, p. 60.

<sup>8</sup> Internat. Encyclop. of Surgery, vol. v. p. 842.

<sup>9</sup> Lehrbuch der Frauenkrankheiten, p. 754.

<sup>10</sup> Princ. and Pract. Surgery, vol. iii. p. 702.

<sup>11</sup> Dictionary of Practical Surgery, edited by Heath, p. 183.

with malignant features. Let us examine these general statements more in detail.

32 patients were alive and well for an average period of 49 months and 10 days after operation, the disease having existed, on an average, for 69 months and 11 days before surgical interference, so that the mean life of these subjects was nearly ten years. The period of freedom from recurrence was

From 1 to 12 months,	in 4 cases. <sup>1</sup>
" 1 " 2 years,	" 4 "
" 2 " 3 "	" 7 "
" 3½ " 4 "	" 5 "
" 4 " 5 "	" 5 "
For 7 years and 3 months	" 1 case.
" 8 "	" 1 "
" 9 " " 11 "	" 1 "
" 10 "	" 1 "
" 10 " " 4 "	" 1 "
" 10 " " 5 "	" 1 "
" 10 " " 9 "	" 1 "

As has been seen, there was local reproduction in 53 cases. In 45, in which the date is noted, the periods of recurrence were as follows:

2 cases in 3 weeks.	3 cases in 12 months.
2 " " 1 month.	1 case " 15 "
7 " " 2 months.	1 " " 17 "
3 " " 3 "	2 cases " 18 "
2 " " 3½ "	1 case " 20 "
2 " " 4 "	1 " " 21 "
5 " " 5 "	3 cases " 24 "
3 " " 6 "	1 case " 29 "
1 case " 7 "	1 " " 32 "
1 " " 8 "	1 " " 36 "
1 " " 9 "	1 " " 48 "

The table shows that more than one-half, or 57.7 per cent., of the reproductions took place in 6 months, while after 12 months there were only 13, or 28.8 per cent., and of these there were only 4, or 8.8 per cent., after 2 years. These statements lead to the belief that the chances for the patient are relatively good after the lapse of 2 years, and that the prognosis is all the more favorable as the period of freedom from signs of local contamination prolongs itself. As the latest date of reproduction was 4 years, we may assume that the 12 cases of the first table which remained well after the lapse of that time were permanently cured. The average date of recurrence was 10½ months, and the total life of these patients from the first observation of the disease to the final

<sup>1</sup> The shortest periods were 1 month, 4, 6, and 10 months.

report after the last operation was 7 years and 9 months. The number of recurrences, or operations for recurrence, was 1 in 23 cases, 2 in 13 cases, 3 in 7 cases, 4 in 1 case, 5 in 4 cases, 6 in 2 cases, 7 in 1 case, 12 in 1 case, and 22 in 1 case.

While the average was  $10\frac{1}{2}$  months, the histological constitution of the growth appears to have exerted a marked influence upon the date of recurrence. Thus, the average date of local reproduction was 4 months and 20 days for the round-celled, 11 months and 27 days for the spindle-celled, and 12 months and 10 days for the giant-celled. The cystic tumors recurred in 8 months and 5 days, and the simple in 13 months and 9 days, and this contrast becomes the more striking when we state that the average date of recurrence for cystic round-celled growths was 3 months and 4 days as against 6 months and 8 days for the simple round-celled, and 9 months for cystic spindle-celled as against 16 months for the simple spindle-celled.

Of the 91 cases metastatic growths, as demonstrated post-mortem, or by unmistakable evidences during life, had formed in 17, or 18.68 per cent. There can be no doubt that this estimate is too low, since of 20 examinations of persons dead from the effects of the primary operation, or dead after secondary operations, metastatic growths were found in 12, or 60 per cent. The total duration of life from the first appearance of the primary tumor to the death of the 17 patients was 57 months, 9 months having been the shortest, and 25 years and 7 months the longest, period. The relative frequency of the seats of the secondary deposits is shown by the following statement:

Lungs,	in 10 cases.	Pleura, in 1 case.
Liver,	" 4 "	Heart, " 1 "
Brain,	" 3 "	Kidney, " 1 "
Dura mater,	" 1 case.	Muscles, " 1 "
Retroperitoneal glands	" 1 "	Bones, " 1 "
Mediastinum,	" 1 "	

The prognosis is materially influenced by the age of the patient and by the size and rate of increase of the tumor. Thus before the age of thirty-five, when the mammary gland is functionally most active, a small, slowly growing sarcoma does not return, while a rapidly increasing tumor, especially the cystic variety, is very liable to recur. Among the latter class of cases, 60.71 per cent. were characterized by recurrence, and 10.71 per cent. by metastatic tumors. Of these, the solid sarcomata recurred in 53.84 per cent., and gave rise to secondary growths in 7.69 per cent., while the cystic recurred in 66.66 per cent., and were marked by metastases in 13.33 per cent. It does not appear, however, as many writers assert, that the more tender the age the more rapid is the growth of, and the more malignant is, the neoplasm. Thus, of 15 cases, the ages of which varied from 9 to 19 years, or  $16\frac{1}{2}$  years on an average, the tumor had been in

existence on an average for  $7\frac{1}{2}$  years before its removal, and 28.57 per cent. remained well, while 71.43 per cent. recurred, and metastases were not observed in a single instance. After the thirty-fifth year, on the other hand, and the danger increases with advancing age, the greater is the liability to metastases, as in this class of cases 19.35 per cent. were generalized, and 43.54 per cent. recurred. Of these, the solid tumors recurred in 47.05 per cent., and gave rise to secondary growths in 23.54 per cent., while the cystic recurred in 44 per cent., and were marked by metastases in 16 per cent. of all cases. In other words, a sarcoma occurring in a functionally active breast evinces a marked disposition to recur after operation, with less disposition to metastases, while a sarcoma of the declining breast recurs less frequently, but is generalized in a greater number of instances.

The prognosis is also influenced by the histological constitution and the stage of evolution of the tumor. Of the spindle-celled 65.10 per cent. recur, and 20.40 per cent. give rise to metastatic growths; of the round-celled 60 per cent. recur, and 25 per cent. are generalized; of the giant-celled 57.14 per cent. recur, and in none are there metastases; of the solid 64.58 per cent. recur, and 25 per cent. are disseminated; while of the cystic 51.16 per cent. recur, and 11.62 per cent. are generalized. Hence, while the round-celled are the most malignant, the metastasis of the spindle-celled is by no means to be denied, nor can we say, with certain writers, that the cystic variety is an innocent tumor, or one of limited malignity, since it recurs in more than one-half of all cases, and generalizes itself in about one case out of every nine. These investigations demonstrate that the usual statements, which are so opposed to the actual facts, as to the malignity of sarcomata, are due either to their not having been based upon a careful analysis of a sufficient number of recorded cases, confirmed by minute examination, or to the confounding of cystic sarcomata with other cystic growths, which never infect the economy.

While I have been unable to collate cases in which the disease ran a natural course, through which we are deprived of data bearing upon the duration of life in this class of patients, and comparing them with the average duration of life of those subjected to the knife, there can be no doubt that operations do result in permanent recoveries, and prolong life, even if a final cure is not attained. From an inspection of the two tables on a previous page, it appears that recurrence may be delayed for four years, and that 12 subjects were alive and well after four years, so that if we take four years as the criterion of safety, the 91 operations show 13.18 per cent. of cures.

Although the recurrent regional disease is more intense than the primary, and other reproductions generally follow in quick succession, the removal of tumors as fast as they appear certainly alleviates suffer-



ing, prolongs life, averts visceral contamination, and occasionally brings about a cure. Thus, Bryant<sup>1</sup> removed the entire breast for a round-celled sarcoma on January 9, 1883, and up to February 10, 1886, performed twelve operations for multiple recurrent growths, the opposite breast being the seat of an atrophic scirrhus of sixteen years' standing. Billroth<sup>2</sup> enucleated a cystic sarcoma, and removed four recurrent growths in four years, the breast being extirpated at the last operation, and the woman was free from disease three years subsequently. Erichsen<sup>3</sup> extirpated the entire breast for a cystic growth of twenty-seven years' standing in 1859, and removed recurrent growths in 1861, 1863, 1864, 1865, and 1866, death ensuing from paralysis "some years after the last operation." In Heath's<sup>4</sup> case of removal of the gland for a spindle-celled tumor, six operations for recurrences were done in thirteen years, and the patient was alive with a seventh recurrence. In that of Haward,<sup>5</sup> a spindle-celled tumor was removed in 1860, and recurrent growths were excised in 1863, 1869, and 1873. The patient died, without metastases, from the effects of the last operation, but life was prolonged, as in the preceding instance, for thirteen years. Riedel<sup>6</sup> removed six recurrences in twenty years following an operation for giant-celled sarcoma, and on death there were no metastases. Gay,<sup>7</sup> in May, 1865, enucleated from the same breast two cystic spindle-celled sarcomata of six years' standing. Recurrent growths were removed in July, 1867, with the entire gland, in May, 1869, and May, 1874, in June, 1878, in May, 1880, and in June, 1881, so that life was extended for fourteen years, and the woman was still living at the date of the last report. The case of S. D. Gross,<sup>8</sup> however, is, so far as I know, the most remarkable on record. In March, 1857, a single woman, aged forty-four, discovered a small tumor in the left breast, which, on enucleation the following October, proved to be a small spindle-celled sarcoma. During the next sixteen months two more partial operations were performed, and a fourth tumor, along with the entire breast, was extirpated in May, 1859. In three months and a half the knife was again required, and soon afterward other tumors were removed. In 1860 she underwent eleven operations, and six in 1861, the last of which was performed in September of that year, so that she was subjected to twenty-two operations for fifty-one recurrent tumors in four years. They varied in size from an almond to a hen's egg; appeared at or near the cicatrices in a few weeks, and rapidly assumed a fungating

<sup>1</sup> Private communication, March 6, 1886.

<sup>2</sup> Die Krankheiten der Brustdrüsen, p. 68.

<sup>3</sup> The Science and Art of Surgery, 8th Amer. ed., vol. ii. p. 711.

<sup>4</sup> British Medical Journal, 1878, vol. i. p. 194.

<sup>5</sup> Trans. Clin. Soc. London, vol. vii. p. 106.

<sup>6</sup> Centralblatt für Chirurgie, 1881, Bd. 8, p. 636.

<sup>7</sup> Trans. Path. Soc. London, vol. xvi. p. 240; vol. xx. p. 359; vol. xxv. p. 233; vol. xxxi. p. 272; and vol. xxxiii., Suppl. p. 24.

<sup>8</sup> A System of Surgery, 6th ed., vol. ii. p. 974.

aspect. Large portions of the pectoral, and also of the external and internal intercostal muscles were cut away, so that during a deep inspiration there was a slight protrusion of the pleura. Ten years and nine months after the last operation she was in perfect health. In these eight cases there was no lymphatic involvement, and the general health was unimpaired.

A study of the preceding facts shows that, like carcinoma, sarcoma is a malignant growth. It differs, however, from the former in many important features, which are shown in the following statement:

	Sarcoma.	Carcinoma
Invasion of the skin by tumor elements . . . . .	9.67 per cent.	68.92 per cent.
Invasion of the chest walls . . . . .	3.87 "	21.58 "
Invasion of the parammary connective tissue . . . . .	0.64 "	8.39 "
Primary invasion of the axillary glands . . . . .	0.64 "	67.35 "
Local reproduction after removal . . . . .	58.24 "	80.97 "
Metastases found post-mortem . . . . .	60.00 "	50.00 "
Average duration of life . . . . .	81 months.	39 months.
Permanent cures . . . . .	13.18 per cent.	10.39 per cent.

From this table it appears that sarcoma is less infectious locally, but more infectious as regards the general system, than carcinoma. Its more relatively benign character is shown not only by the larger proportion of cures, but also by the fact that the average duration of life, from the first observation of the disease to the date of the last removal after operation, is forty-two months longer; and this contrast becomes the more striking when it is stated that the majority of the sarcomatous patients were still living, and the majority of the carcinomatous subjects were dead. Not only is this statement true for sarcomata in general, but it holds good for the three varieties, since the average life for round-celled sarcoma is fifty-four months, ninety months for the spindle-celled, and one hundred and eight months for the giant-celled.

The diagnosis of small, slowly increasing fibrous sarcomata is by no means easy, as they are very liable to be confounded with fibromata, particularly when they arise at the circumference of the mamma. A tumor, however, of soft, apparently fluctuating consistence, with elevated temperature, conveying the impression of an abscess, and occurring in young women, which attains a large volume in a few months, can scarcely be anything else than a medullary sarcoma. On the whole, the diagnosis is based upon their indolent origin, mobility, elastic, or unequal consistence, lobulated outline, rapid increase, freedom from lymphatic involvement, their tendency to ulcerate, the not infrequent discoloration of the skin, and enlargement of the subcutaneous veins, and, possibly, elevation of temperature; upon the suffering which they awaken late in the disease; and upon their greatest frequency after the fortieth year.

The only tumors met with before the age of sixteen are fibromata and

sarcomata, the former being twice as common as the latter. The fibromata are always solid, and grow slowly, while the sarcomata are cystic in three-fourths of all instances, and medullary in the remaining fourth, and, as a rule, grow rapidly. Hence cystic and medullary tumors at this period of life are sarcomata and nothing else.

Between the spindle-celled, round-celled, and giant-celled there are some marked similarities which render their differentiation difficult. The spindle-celled, however, are characterized by their development at a comparatively early age; by the attendant suffering; by the enlargement of the subcutaneous veins; by their slow reproduction after removal; and by their long life. The round-celled, on the other hand, appear, as a rule, at a comparatively late age, and are painless; but the skin is liable to be discolored and ulcerated, and recurrence is rapid, and the duration of life is relatively short. The giant-celled likewise appear late in life, but are painful; discoloration of the skin and ulceration are also common; but there is no enlargement of the veins, while irritative enlargement of the axillary glands is frequent. Local reproduction is delayed longer than in the other varieties, and the duration of life is remarkable.

These points are set forth in the following table, in which the affinities and contrasts of the three principal varieties may be seen at a glance:

	Spindle-celled.	Round-celled.	Giant-celled.
Average age of appearance . . .	36 years.	48 years.	47 years.
Appear before 16th year . . .	12.08 per ct.	0.83 per ct.	0 per ct.
Pain . . . . .	60.00 "	10.81 "	43 "
Skin discolored . . . . .	20.88 "	32.35 "	25 "
Ulceration . . . . .	17.58 "	23.58 "	25 "
Veins enlarged . . . . .	17.58 "	11.76 "	0 "
Glands swollen . . . . .	6.59 "	8.82 "	37.5 "
Glands infected . . . . .	0. "	2.94 "	0. "
Adjacent tissues invaded . . .	13.18 "	17.64 "	25 "
Local reproduction . . . . .	65.10 "	60. "	57.14 "
"    "    average date of	12 months.	4 $\frac{2}{3}$ months.	12 $\frac{1}{2}$ mos.
Metastatic deposits . . . . .	20.40 per ct.	25 per ct.	0 per ct.
Average life with operation . .	90 months.	54 months.	108 mos.

Between the solid and cystic varieties there are certain distinctions, which are useful in establishing a differential diagnosis. The former develop at about the forty-third year; the skin is discolored in 11.53 per cent; ulceration occurs in 7.69 per cent.; the veins are dilated in 7.69 per cent.; there is no discharge from the nipple, nor is it retracted; pain is met with in 28 per cent.; the surrounding tissues are invaded by tumor elements in 11.54 per cent.; the lymphatic glands are enlarged in 11.54 per cent., and infected in 1.28 per cent.; recurrence ensues in 64.58 per cent., and metastatic growths are met with in 25 per cent. of all instances. Cystic sarcoma starts, as a rule, at the thirty-eighth



year, and is not, as is asserted by many writers, most common between twenty and thirty-five years, as just as many cases occur after as before the latter age; it grows more rapidly than the solid variety, and its increase is often sudden after having remained stationary or advanced slowly for some time. Now and then, after evacuation of the fluid of the superficial cysts, their solid contents can be detected by manipulation; their consistence is, as a rule, unequal, and they are more largely lobulated than the former variety. The skin is discolored in 34.61 per cent.; the tumor ulcerates in 18.76 per cent; the veins are enlarged in 23.07 per cent.; the nipple is retracted in 6.41 per cent., and discharges fluid in 10.25 per cent; pain is experienced in 41.93 per cent.; the adjacent tissues are infected in 16.66 per cent.; the lymphatic glands are swollen in 5.12 per cent., but they are never invaded by tumor elements; while it recurs in 51.16 per cent., and becomes generalized in 11.62 per cent. of all cases.

There are no signs by which cystic sarcomata can be absolutely differentiated from cystic fibromata, with which they are so frequently confounded. The latter develop earlier in life, and a discharge from the nipple is more common than in the former; but ulceration and enlargement of the veins are only one-half as frequent, and they are not attended with glandular enlargement or malignant features. It should, however, be stated that the largest proliferous cystic tumors met with in old, married multiparæ are generally sarcomata

As no attempt has hitherto been made to describe the life history of the giant-celled variety, and some of the modified forms of mammary sarcoma, the following facts will be found to be not devoid of interest.

In 8 cases of giant-celled tumors that I have collated, the average date of their first observation was  $47\frac{1}{4}$  years, or at the ages, respectively, of 42, 45, 45, 46, 46, 49, 50, and 55. Of the 6 cases in which the social condition is noted, 3 were married, of which 2 were parous, and 3 were single. The tumors were solid in 6, of which one was alveolar, and cystic in 2. The skin was violaceous in tint and adherent in one case of cystic tumor, and red and stretched in one of solid tumor. In one of the cystic tumors there was firm attachment to the great pectoral muscle. Ulceration was met with in 3, of which 2 were solid and 1 was cystic. The axillary glands were enlarged but not infected in 3 cases, 2 of which were cystic and 1 was solid, and enlarged lymphatic glands were detected in 3 cases of recurrence of solid tumors, in 1 of which, an alveolar growth, they were invaded by tumor elements.

All of the cases were subjected to the knife. In 1 the history ceases with the operation.<sup>1</sup> In 3 there was no recurrence, and the patients were alive subsequently for ten years and five months,<sup>2</sup> three months,<sup>3</sup>

<sup>1</sup> Estlander : *Rev. Mens. de Méd. et de Chir.*, 4, 1880, p. 795.

<sup>2</sup> *Ibid.*, p. 796.

<sup>3</sup> Lancereaux : *Bull. de la Soc. Anat.*, t. xxxv. p. 292.



and ten years.<sup>1</sup> In 4 the tumor recurred. In Billroth's<sup>2</sup> case, a reproduction, with infected glands, was removed in two months, and another similar operation was performed in a few months. The patient died of erysipelas, but metastases were not found post-mortem. In the case of Riedel,<sup>3</sup> six recurrent growths were removed in twenty years, and on death it was found that the patient was free from metastases. In the case of Estlander,<sup>4</sup> a recurrent growth, along with the glands of the axilla, was removed in two years and five months, and the patient was well five years and nine months subsequently; while in the case of Stanley,<sup>5</sup> the patient died with a recurrent tumor in two years after the extirpation of the breast. The average total duration of life of these patients from the first observation of the disease to the final report was nine years.

It will thus be seen that giant-celled, or myeloid, sarcoma sets up irritative enlargement of the lymphatic glands in 37.5 per cent. of all cases; that the skin is discolored, the tumor ulcerated, and the surrounding tissues are infected in 25 per cent.; that the subcutaneous veins and nipple are normal; and that, while it recurs in 57.14 per cent., it never gives rise to metastatic growths.

Osteoid sarcoma, or the variety which contains true osseous tissue, has been met with at the ages of 27, 46, 49, and 51 years, the average being 43 years. It occurs usually in married multiparæ; as a rule grows slowly; is hard, except when it has undergone cystoid degeneration; acquires large dimensions in one-half of the cases, and is painful during its rapid growth. It ulcerates in one-fourth of all instances; invades the adjacent tissues in one-half; does not infect the lymphatic glands, nor is it marked by dilatation of the superficial veins.

The case recorded by Durham<sup>6</sup> is devoid of further history. Of the three reported by Stilling,<sup>7</sup> in which an operation was practised, one died in twenty-three months, without recurrence, but with evidences of metastatic growths in the lungs and pleuræ; one died of pneumonia on the third day, with secondary tumors of the lungs, and sarcomatous thrombosis of the veins of the pectoral muscle, the disease having existed for eighteen months; and the third was characterized by two local reproductions, and a metastatic growth of the left ventricle of the heart, about sixteen weeks after the primary operation, the total life having been ten years and four months. The average life of these cases from the first observation of the disease until its termination was fifty-seven months, and the average life after operation was thirteen months and a

<sup>1</sup> Paget: Trans. Clin. Soc. London, vol. vii, p. 108.

<sup>2</sup> Die Krankheiten der Brustdrüsen, p. 58.

<sup>3</sup> Centralblatt für Chirurgie, 1881, No. 40, p. 636.

<sup>4</sup> Ut supra.

<sup>5</sup> Paget: Lect. on Surg. Path., 3d ed., p. 555.

<sup>6</sup> Trans. Path. Soc. London, vol. xxxv. p. 378.

<sup>7</sup> Deutsche Zeitschrift für Chirurgie, Bd. xv. pp. 247-253.

half. Hence, metastases occurred, or were presumed to have occurred, in all the cases, and of those who survived the knife local reproduction was witnessed in one-third, and a recurrent growth would certainly have been formed if the patient with sarcomatous pectoral veins had survived. From these considerations, osteoid sarcoma must be regarded as the most malignant of the mammary sarcomata.

The life history of pigmented alveolar round-celled sarcoma can only be based upon two cases. In that of Billroth,<sup>1</sup> a hard tumor, of three years' duration, as big as a child's head, and adherent to the skin, was removed, along with infected glands, from a multipara sixty-five years old. The patient died of exhaustion, without recurrence, in eight months, but there was no post-mortem examination. In the case of Butlin,<sup>2</sup> a tumor of seven years' standing was removed, in 1880, from the otherwise normal breast of a woman of fifty-eight. Recurrent growths were extirpated in 1882, 1884, and 1886, but the history ceases with the last operation. In addition to these cases, Wacker<sup>3</sup> describes a case of multiple melanotic alveolar round-celled sarcoma of both breasts, with infection of the glands of the left axilla, and metastatic tumors of the spleen, mesenteric glands, and brain. The disease was thought to be secondary to melanotic sarcoma of the skin of the mammae. Winkel depicts a proliferous myxomatous melanotic sarcoma, but the case is devoid of history.<sup>4</sup>

The treatment may be summed up in a few words. The entire breast, along with any skin that may be invaded, must be extirpated, especial care being paid to the complete removal of every particle of parammary fat and the fascia of the pectoral muscle, in which tissues experience shows that recurrence takes place. In the event of repullulation the growths should be freely excised as fast as they appear, as such a practice not only prolongs life, but may bring about a final cure.

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## ON THE REMEDIAL VALUE OF BLOODLETTING.

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It has often seemed to me a matter of regret that a remedy of such unquestionable power as bloodletting should, from former abuse, be reckoned by many as among the things of the past, and that it should have run the risk of being denied all virtue, because of some inherent

<sup>1</sup> Op. cit., p. 56, fig. 57.

<sup>2</sup> Lancet, January 8, 1887, p. 72.

<sup>3</sup> Inaug. Dissert., Rostock, 1884, p. 15.

<sup>4</sup> Lehrbuch der Frauenkrankheiten, p. 756.

faults, which, however, are quite capable of compensation. Its very power, and the exact results which in fitting cases attend its employment, doubtless led to its indiscriminate use, and, inasmuch as it is spoliative in its nature—a power fraught, it may be, with the greatest evil—it is not difficult to see how readily it might be abused. The dangers attaching to this abuse once fully recognized, the extreme oscillation was readily foretold, for in medicine, as in the sciences, which are—maybe—more exact, the pendulum of opinion swings freely and its resting points may be very widely distant.

Bloodletting is not the only form of treatment to which time and increase in knowledge have carried wise modifications. Thirty years ago there developed what many now regard as a craze for alcohol-giving, and when we note the position it held then, and call to remembrance that which it holds now, we may almost cherish a hope that a power as valuable, and not more difficult to handle, may again take a recognized position as a valuable remedy. With that greater skill which is undoubtedly ours, with that more intimate acquaintance with physiological and pathological processes, we are better able to judge the exact capability of such a remedy, and when we recognize in it the power to modify the distribution of the blood, and to diminish pressure within the vascular system, then we are moving on such lines as are well fitted to guide us in its employment. That it can do more than these things is probable. That it does act as a derivative, that it is a powerful though dangerous sedative, and that its employment facilitates the action of other remedies is all possible, and, although I believe that few would incline to employ it for such ends solely, its possession of such potentialities may render it of wider service than we anticipate when we use it.

Maybe the strongest objection to its employment lies in the dread that by the abstraction of blood we tend directly to weaken our patient; but this fear is, I am sure, exaggerated. Several observers, among others Sir James Paget, believe that bloodletting in limited quantity is attended with little risk of immediate or remote injury, and a physician of such eminence and ability as William Pulteney Alison states "that the idea of subsequent injury to the constitution from the use of bloodletting in inflammatory diseases may, in general, be regarded as quite visionary." Every obstetrician must have noted the absolutely unimpaired recovery of lying-in women in whom a moderate post-partum hemorrhage has occurred, and to the surgeon it is a matter of every day experience that in the large majority of surgical operations not complicated by previous shock, and unattended by excessive hemorrhage, a certain loss of blood in no wise hinders a satisfactory convalescence. In making such references I know that I lay myself open to the very evident contention, that such patients are, at the time the loss is sustained, in the full tide of health, but this is hardly so, for the blood of the pregnant woman,



although greater in bulk, presents those very characters which excessive hemorrhage develops—it is deficient in hæmatin, and it contains an excess of fibrin; while most surgical patients demanding for their relief severe operative measures cannot, as a rule, be held to have the fullest health. Moreover, it happens that in many cases of debilitating disease, hemorrhage, it may be as the effort of Nature, does occur, and its occurrence hinders neither the favorable progress of the malady, nor the convalescence from it. One such instance occurs to me now. A young gentleman, a patient of Dr. Walker, of Dalston, who has for many years been the subject of mitral disease with well-marked aortic regurgitation, and who for the past two years has had chronic Bright's disease, was at the end of last autumn seized with acute pleuro-pneumonia. A more unpromising case it would be difficult to find, for he had suddenly superadded to his burden of chronic and incurable disease, an acute inflammatory ailment, attended with high temperature, much dyspnœa, and very considerable physical suffering. Owing, in part, to the existence of renal disease, and doubtless, in part, to the presence of aortic insufficiency, he had on the night of my first visit a considerable epistaxis. That it had done him no harm Dr. Walker was confident, and my own feeling was that it had probably done him good. A recurrence happened some days later, and, although upon that occasion, owing to the absence of his doctor, he lost a good pint of blood, which, undoubtedly, *temporarily* debilitated him, he struggled through his pneumonia, and, what was even more satisfactory, he recovered after a single tapping from the empyema of which his pleural effusion was constituted. Had excessive dyspnœa demanded it, how few would have dared to bleed this man to twelve ounces, and yet events demonstrated that even such a loss was not incompatible with a satisfactory recovery.

It has been written by a great clinician that “men bear no mark that denotes their great or their small susceptibility to mercury,” and this in a measure seems true of bloodletting also, for in the case of chronic disease I have related a very considerable hemorrhage made little apparent difference, whereas Dr. John Duncan tells me that an athletic student who, in perfect health, was bled for purposes of transfusion, was long in recovering from its effects. That idiosyncrasy should exist with reference to bloodletting, experience in the use of many other remedies would lead us to expect.

In considering the advisability of the employment of bloodletting, the primary questions which arise are these: Is the condition of the patient so urgent as to demand its aid, and is there a fair probability of the loss he will thus sustain being satisfactorily replaced? Wise and necessary as is this association of interests, and important as is its general maintenance, it is easy to understand how the importunity of the one may, at times, justly overrule the prudence of the other, for when life is in im-



minent jeopardy we must act for the present, cherishing the hope that the good to be attained may quite outdo the evil attendant upon the letting of blood. And this position is made still stronger when we call to remembrance the fact that in the very large majority of cases the loss of blood need not be great, for the effect we desire is an *immediate* one, one if at all attainable, produced very quickly, and, therefore, bloodletting by possessing this quality has that within itself which is adverse to the withdrawal of an inordinate amount. Thus is it that the aphorism of Sir Thomas Watson is readily compassed, "bleed so as to secure the advantages of the remedy and to avoid its disadvantages," and with a view to a demonstration of the value it certainly possesses, I will, in dealing with this question, relate some of the scattered lessons of my own limited experience.

When bloodletting was in the plenitude of its power there was no morbid condition in which it was employed more unhesitatingly than in apoplexy. The reasons for this are not difficult to seek, for, homœopathic as such treatment may be reckoned, there can be no reasonable doubt that in many cases of severe visceral hemorrhage, general bloodletting is alone able to control it. The temptation to make this knowledge the foundation for action was doubtless increased by the condition of the pulse generally associated with cerebral hemorrhage; for the feeling it conveys through its very fulness is that of its hurrying on in such a volume as is certain to increase extravasation and nerve destruction. Thus, I fancy, it was that bloodletting became the "*summum remedium*" in all cases of apoplexy, and, although we now know that in the very large majority of instances it is not only a powerless, but a dangerous remedy, there is one form of attack in which most physicians agree it may still be employed with possible benefit—that form is the *ingravescent*. Unhappily, the cases are rare in which opportunity offers for its use, for its earlier march, at times slow enough, it may be, to anticipate, is too frequently hastened by the attacks of vomiting which characterize it.

In the last two cases that have come under my observation this history was most notable, for with the access of vomiting there came such acuteness in the development of coma, that it quite outran any possible good derivable from bloodletting.

That in fitting cases—cases seen early in their progress—it may prove useful I shall endeavor on lines which are fairly parallel to show.

Experience gained by the surgeon is often of equal value to the physician, for, although the conditions which give rise to certain results differ, the results themselves are so akin that the danger pertaining to them has a common significance. Therefore it is that I quote the following case to show that in bloodletting we have a remedy of value in

"ingravescent apoplexy," albeit that apoplexy be external to, instead of within, the cerebral cortex.

M. B. was thrown with great force from the conveyance in which he was driving, and pitched upon his head. He had well-marked concussion, followed by decided reaction, with a full, but not too rapid pulse. Some hours after he was first seen he was attacked with severe headache, complained of a rushing noise in his ears, had some embarrassment in his breathing, was a little confused, had widely dilated pupils acting slowly to light, and his pulse had fallen from over 80 to 52 in the minute. He was at once bled to the extent of a pint, which relieved his headache, and his breathing, and under which his pulse rose to its old rate of 80 in the minute.

A few days after, having, contrary to all instruction, risen from his bed and made some exertion, the old symptoms reappeared, headache, dilated inactive pupils, and slow, laboring pulse. Venesection again, and with this great relief, and an ultimate satisfactory recovery.

It may fairly be argued that in this case I have no certain proof to offer that extravasation had occurred, and I am glad that such proof is wanting, but I have notes of another case in which, following a severe blow on the head, there were, on three separate occasions, attacks exactly similar to those observed in M. B., the last of which, unhappily, proved fatal, and in that instance a post-mortem examination demonstrated the presence of a large clot, part of which had been recently effused, but of which other portions had, undoubtedly, been in existence for some little time. I record it as a matter of regret, that this case was not treated by venesection. It seems then but a fair deduction that a remedy which can arrest hemorrhage occurring outside the brain, should have equal power to control leakage taking place in its substance.

The power for good possessed by bloodletting in morbid states of the cerebral circulation is not, however, confined to the arresting of hemorrhage. There are certain pathological conditions attended by convulsive phenomena over which it exercises a happy control. The rationale of this is readily found through a mechanical explanation, for the tightly packed, and the unyielding character of the cerebral case, renders any disturbance in its vascular system fraught with very decided danger. If the amount of blood circulating in it be of necessity an ever definite quantity—and this, I believe, has been fairly demonstrated—then it follows that disturbance, say of a spasmodic character, in the arterial system must be associated with a plethora on the venous side. By their researches, Kussmaul and Tenner proved that sudden cerebral anæmia may induce convulsion, and there is a strong probability that the "status epilepticus," when fully developed, depends upon a pronounced anæmia in certain cerebral areas. This was the contention of Sir J. C. Brown, and the basis upon which he founded his treatment of it by the use of nitrite of amyl. Before, however, this valuable remedy had

been used in this way, it had happened to me to find how completely this dangerous condition could be relieved by free venesection.

One case I well remember, where the fits recurred with such rapidity and regularity, and where the intervals were marked by so profound a state of coma, that the man's condition seemed well nigh hopeless. A big bleeding, for he was a strong, healthy man, at once arrested his fits and, I believe, saved his life. That it acted by relieving a stasis in the cerebral venous system, and thus permitted a readier transmission of blood through the smaller arteries and capillaries, is probable.

Trousseau draws attention, in one of his masterly lectures, to the fact that in certain cases of convulsive epilepsy we may have a state of tonic convulsions lasting for a long time, "two or three minutes, instead of three times the number of seconds, and death from asphyxia as a consequence." I once witnessed in a little girl, the subject, not of true epilepsy, but of most severe convulsions depending upon a functional cause, this very state established, and the happy issue that resulted from the abstraction by me of a few ounces of blood from the external jugular, was one of the early experiences of my professional life.

If the theory of Dr. Hughlings Jackson (*Brain*, April, 1886) be correct, that infantile convulsions depend largely for their development upon a venous condition of the blood circulating in the respiratory centre, then it is not difficult to understand how oft-repeated and long-continued spasm, interfering as it does with the respiratory act, should perpetuate the tumult, and how direct relief to the venous system may speedily arrest the convulsive disturbance.

Before proceeding to allude to those conditions in which the benefit attending bloodletting is conspicuous and undoubted, I would make mention of the advantage which attends its employment in certain cases of simple croup. I am not likely now ever to forget—for the early writings on the folds of memory are the most indelible—the relief which I, when a little lad, suffering from croup, obtained by venesection. Emetics, hot fomentations, and the warm bath, had all been employed, but with no benefit, the dreadful feeling of suffocation was still unrelieved, while following immediately the withdrawal of several ounces of blood from the arm I was easy and comfortable.

It would be a marvel, then, that if thus taught, it seemed the lesson of a *life* in its fullest sense, I should have denied the same relief to others, and thus it is that, in late childhood and early youth, when other means have failed, and when in vigorous adolescents, cynanche laryngea is marked by the symptoms noted by Cullen, "respiratio difficilis, inspiratio strephens, vox rauca, tussis clangosa," then my trust, and my expectation, lie in a moderate phlebotomy.

In the treatment of visceral inflammations bloodletting held for long the leading place, and although the virtues it was said to possess are by



many openly questioned to-day, there undoubtedly exist still certain conditions, the result of inflammatory hyperæmia, where its action is of signal benefit. That this should be so seems a natural inference when we recall the fact that in disturbed and perverted action of the vascular system, arise those changes which mark this morbid state, and that bloodletting exercises such power over the circulation as is unmistakable and undeniable. That the establishment of acute hyperæmia in the pulmonary area should exert a most pronounced effect on the whole vascular system, and that the action of bloodletting should, in this case, may be, best demonstrate its power is readily surmised.

The further fact, that the manifestation of this power is *immediate* renders it in such conditions as those to which reference will be made, of the very highest value. The little knowledge I have of its employment in pneumonia is in no wise sufficient to justify any expression of opinion as to its favorable effect upon the type, and the duration of inflammatory disease. All I wish to claim for it is its mechanical power of relieving suffering, of relieving blood-stasis, of restoring a lost balance between heart and arteries, and in this wise abating certain symptoms, the presence of which threaten very directly the life of the patient.

In pleurisy attended with grave inflammatory fever, with severe stitch, and with much difficulty in breathing, I have seen the most marked relief follow the practice of bloodletting. Now, however, that we possess in the hypodermatic injection of morphia so direct and so speedy a means of allaying pain, the temptation to use the lancet is not so great, for if there was *one* feature in the case which venesection did benefit, it was the intolerable suffering the patient was enduring.

I have a belief that the most dangerous forms of this disease are not those in which there is much effusion, rather are they marked by the exudation of lymph over a very wide area, and it was in the early days of such cases that venesection seemed to me to prove most beneficial.

Around the treatment of pneumonia has the dispute regarding the virtues and the evils of bloodletting raged most fiercely. This, to say the least of it, has been unfortunate, for, although there can be no doubt that indiscriminate bloodletting in pneumonia did an infinitude of harm, and ought, as a rule, to be entirely deprecated, there is still one form of the disease, and there are certain states which may arise in its ordinary course, in which to withhold its performance would be a grave error.

Let me, by the short narration of a case, illustrate the form of pneumonia in which, by its action, it may prove more than a mere alleviator.

A. H., a strong, muscular ploughman, had, by an unfortunate accident, the wheel of a heavily loaded cart "backed" across the right side of his



chest. Five at least of his ribs were fractured; he had considerable emphysema, some pneumothorax, and pretty profuse hæmoptysis. Thirty-six hours after the receipt of his injury he was found with all the symptoms of acute pneumonia. He had grave inflammatory fever, his temperature was high, his pulse hard and full, he had an incessant short cough, and much difficulty in his respiration. That this difficulty was in a measure brought about by the pain attending upon the increased respiratory efforts was very apparent.

It was impossible to examine satisfactorily the anterior part of the chest, but behind, he had over a wide area very decided dullness upon percussion, with harsh respiration. I bled him freely from the arm, with great and immediate relief. Within the next twenty-four hours his pulse and temperature fell quickly, and although his lung afforded evidence of more or less consolidation for some days after, it never, I believe, reached the stage of true hepatization.

That in this case bloodletting, by the power it exercised over the distribution of blood, carried relief to the pulmonary circulation, which, through the operation of various factors had become overcharged, and thus assuaged dangerous symptoms, is fairly certain.

Wide, and great, as the difference undoubtedly is between pneumonia following an injury, and the disease as we meet it in the ordinary way, and certain as is the tendency it often has, when appearing in this shape, to terminate life by asthenia, we may witness ever and again in its course such conditions as demand for their relief that promptitude in action which bloodletting alone can bring, and here again I will make use of a clinical note.

B. G., a healthy lad of twenty, was the subject of right-sided pneumonia. For the first five days of his illness matters went fairly well with him. He had a quick pulse, and a high temperature, but his respiration was not more rapid, or more distressing, than the pretty complete involvement of nearly his whole right lung readily explained.

On the sixth morning, however, the aspect had changed—he was struggling for breath, his face, his lips, and his tongue were livid, his pulse was quick and small, but *he had a strongly beating heart* and copious pneumonic expectoration. Examination of the back of his chest revealed the fact, that in addition to the harm in his right side, he had now fine crepitation over the left base, proving that both lungs were implicated. He was at once bled to ten ounces and with immediate relief. Stimulants and liquid nourishment were given him with a free hand, his poultices were continued, and he ultimately made an excellent recovery.

The explanation of the sudden gravity of this man's condition lay in the occurrence of over-distention of the right heart, the direct sequence of that further obstruction in the pulmonary circulation which the congestion of the left lung had brought about. The feebleness of his pulse at the wrist, proof of the small quantity of blood pouring into the left ventricle, and the violently acting heart excited by the presence of an unwonted amount of blood, and doing that which in it lay to overcome

an obstruction which threatened the extinction of its action, formed the best and the surest indication for the abstraction of blood. Vigorous as a heart may be, and capable in ordinary circumstances of contending for a time with stasis in the pulmonary circuit, there can be no doubt that in the pyrexia which marks the pneumonic process, we have that which, by favoring the occurrence of rapid dilatation, renders the struggle more doubtful, and the necessity for immediate action more imperative. For this reason it is that in extreme dyspnoea, and when there is evidence of a lost balance between the right and left heart, a remedy which like bloodletting is proximate in its action, is of the very highest value.

Prevalent as is pneumonia, and frequent as are the opportunities afforded to the practitioner for observation of its treatment, the occasions are very few, and very far between, in which bloodletting is demanded.

It is, however, otherwise with another disease of the lungs—acute pulmonary oedema—suffocative catarrh.

I am not aware that the essential pathology of this condition is fully determined. It is often so sudden and so swift in its onset, so evanescent in its existence, attended by so little constitutional disturbance, and withal so grave in its possible results, that it may well be a neurosis—vasomotor in its seat, and having for its characteristic feature the rapid outpouring of mucus into the smaller bronchi. It very usually arises from exposure to cold during the existence of a bronchial catarrh, and it is strongly predisposed to by the presence of disease of either the heart or kidney. In both these morbid states there doubtless exist such vascular conditions as influence gravely the mechanism of the pulmonary circulation, and dependent, mayhap, upon this fact rests the value of bloodletting in its treatment.

How great that may be, this case will best explain.

A gentleman, past middle life, consulted me some time ago on account of dyspnoea on exertion. He had been quite well until a few months before he visited me, when, without warning of any kind, he had an attack of pulmonary apoplexy which nearly proved fatal. His pulse struck me as hard and tense, and his heart-action as too forcible, although there was no very decided increase in the cardiac dulness. There was, however, a marked impurity and prolongation of the first sound at the apex, and a certain heaving action in this situation. The second sound at the base was markedly accentuated.

I examined his urine with care—it was of acid reaction, of good specific gravity (1.025), and was free from albumen.

I was puzzled, for I expected to find evidence of a granular kidney, and failing in this I fell back upon the hypothesis that he might possibly have slight mitral stenosis.

Uncertain on this point, and still believing that arterial tension was playing a part in the production of his symptoms, small doses of calomel were prescribed, and he was carefully dieted. From time to time he

called upon me, and his record was one of improvement. Then at midnight on the 16th of October I was sent for hurriedly, and found him extremely ill. He had caught cold a week before, and had had more or less cough. On the afternoon of his attack—a cold, raw day—he had driven many miles in an open carriage. Up to the time of his retiring to rest he made no complaint, but as sleep was about to overtake him, he was suddenly roused by a feeling of intense dyspnoea. Living as he does close by me, I was soon beside him. He was propped up in bed, and wheezing loudly; his face was flushed, his expression anxious, and while he breathed with great difficulty, he expectorated from time to time the reddish mucus characteristic of suffocative catarrh. His pulse of 80 was hard and laboring, but his heart's action was not perceptibly increased, either in rapidity or in force, and his chest, clear on percussion, was filled with mucous and submucous râles, with an entire absence of vesicular murmur. Short time as the attack had lasted his condition was too grave to be benefited by the use of expectorants, and I made preparation to give him a subcutaneous injection of apomorphia. The advance of the disease was more rapid than my action, and he quickly passed into that state of semi-consciousness when the action of emetics is neither so prompt nor so satisfactory.

Dr. Lockie, for whom I had sent, now joined me, and we happily agreed as to the employment of bloodletting; he however remarked, and I quote his words to mark the gravity of the case, “bleed him or not he will die.” He was now more or less unconscious, he was livid in color, and his heart, quickening in action, was unquestionably failing in power.

The opening of a vein in the left arm, performed in the usual way, proved futile, for the blood was so thick and tarry that it would not flow from it; so dissecting down upon the right median basilic, and exposing its surface clearly, I made into it a long and free incision. By constant pressure and friction the stream began, slow at first, and then more full, and when a pint of blood had escaped he expressed himself as “beginning to be relieved.” Another pint was taken, and as the arm was being bound up, he said, “I am quite well; I could rise and walk.” Within thirty-six hours, and without the occurrence of much expectoration, all râles had disappeared from his chest, and he was in his usual health. Since then he has had another similar attack, not attended, however, with quite such peril, for he was seen early, and he was bled to twelve ounces. The relief obtained upon this occasion was as striking as it was upon the previous one.

Now, his case is clear, there is a trace of albumen in the urine, there are to be found a few granular casts, and he presents unmistakable evidence of considerable arterial tension.

In cases such as this, where the advance of disease outstrips the action of all ordinary remedies, the immediate effect of bloodletting touches the miraculous.

To the good it can accomplish in cases of mitral stenosis, when, under certain circumstances, the chronic condition of distention of the right ventricle, always more or less in existence, becomes suddenly aggravated, I can bear no personal testimony; but the want of it is of small moment when I can refer for confirmation to the writings of Broadbent, of Chambers, and of many other able physicians.



Here, however, I would add an interrogatory note.

It is well known how much Dr. Angus Macdonald ("Heart Disease during Pregnancy") did to bring into recognition the peculiar dangers attendant upon cardiac disease in childbearing women, and how valuable are his records of the unfortunate progress of some of these cases. In one such, not however under my own care, in which mitral disease and pulmonary œdema brought about a condition of extreme gravity during labor, venesection proved of the greatest benefit, and I have a belief that I have seen relief to the struggling action of the diseased heart brought about by the increased tension accompanying delivery, follow the occurrence of a somewhat free post-partum hemorrhage. It is quite possible, then, that venesection might relieve the serious symptoms which, in such circumstances, at times *immediately* follow delivery.

Among the new phrases which mark the advance of the science of medicine there is none better known than that of "arterial tension," yet some accept its existence with reservation, and incline to believe, that as its presence is not easily refuted, and is often more a matter of opinion than demonstration, it is a *modern* term apt to be used with too convenient a looseness. It seems to me, however, that in the recognition of that hard, incompressible character of the pulse, which formerly led so often to the practice of venesection, lies the demonstration, that although lacking that full knowledge of the dangers which, to us, this condition portends, arterial tension has long been regarded by the profession as one of the states which bloodletting can successfully combat. And so it remains, for, spite of the teaching of Foster, that moderate bloodletting does not reduce blood-pressure, there is ample clinical evidence to show that it possesses the power of relieving those urgent symptoms which are the direct issue of acute increase in vascular tension.

High arterial tension is most familiar to us in connection with renal disease, and some of the most formidable states which arise in its course have probably a very close connection with its existence.

The pulse in some cases of acute Bright's, and in granular disease of the kidney generally, has very special characteristics, and when, as time runs and under the retarding action of the muscular arterioles pressure in the arteries rises high, its cord-like feeling is unmistakable. Then it is, I believe, that convulsive phenomena are most apt to make their appearance, and in certain cases imperatively demand for their relief the employment of general bloodletting.

How valuable this may prove, the following case, the last of its kind which has come under my observation, and belonging to a group well known to most practitioners, albeit the subjects are generally of more tender years, will show.

Some little time ago I saw with a practitioner in a neighboring county, a gentleman suffering from scarlatinal nephritis. He had been ill for



three days when I was asked to visit him, and he had been treated in the most judicious way. He had been purged, had hot air baths, had pilocarpine injections, and such a diet as was best suited for him. Still he did not improve, his urine was exceedingly scanty and highly albuminous and a complaint of some dimness in vision made his attendant anxious about him. At the time we entered his room together he was in a violent convulsion, a foreboding of which occurred about an hour previously when he became suddenly quite blind. When the violence of the seizure had passed he was deeply unconscious, pale in the face, with a small pulse at the wrist, hard, however, and unyielding as whipcord, and with a forcibly acting heart, of which the sounds, both at base and apex were highly accentuated. With the acquiescence of his doctor I bled him freely from the arm, and with such benefit that in a little while he became conscious and made complaint of headache. Two hours after we left him he had another but much milder fit, in the struggles of which the retaining bandage on the arm became undone and he sustained a further loss of blood. This, however, did him no harm, for when his attendant, sent for hurriedly to visit him, arrived, he found him fully conscious and free from discomfort. This condition happily proved permanent, there was no recurrence of the convulsion, and he made, thanks largely to the bloodletting, an unusually rapid and satisfactory recovery.

A case of renal disease such as this, is typically the one in which bloodletting may be employed without hesitation. The condition which has led to the production of the convulsion is acute in character, it has been but a short time in existence, there is no preëxisting impoverishment of the blood, and nothing of that deep undermining of the strength which marks the chronic Bright's. Apart altogether from the unmistakable relief to the convulsive disturbance which venesection in such circumstances usually brings, there is the further possible good it confers upon the general state of the patient. It is not often that now we treat inflammation as such by the abstraction of blood, and yet I venture to believe that in acute nephritis, occurring in a robust and healthy subject, there is no line of primary treatment more likely to prove beneficial than venesection. My reasons for thinking this are twofold: one the knowledge that in some instances death has been the direct and rapid result of such cardiac harm as is brought about by the sudden occurrence of acute arterial tension; and the other, the observation, frequently repeated, of the immense benefit which has followed the occurrence of a smart attack of hæmaturia. There is probably no organ in the body in which vascular pressure is so consistently high as in the kidney, and none in which bloodletting has more decided effect, as witness the benefit which follows its practice in certain cases of severe renal hemorrhage.

In dealing with convulsions in cases of chronic diseases of the kidney in some of which it is of striking value, we require to be more guarded in its employment. Here two points are worth remembering. The one, especially applicable to such cases, is the dictum of Graves in connection with bleeding, that "you may rely on it that every ounce of healthy

blood you take away is shortly replaced by two ounces very inferior in quality," and the other, that an impoverished condition of the blood is a factor in the production of uræmic convulsion, and that bloodletting by producing this state may predispose to future attacks. In some patients, however, enfeebled beyond all doubt, in whom convulsions have their origin in local cerebral œdema, its occurrence marked, it may be, in addition by the presence of hemiplegia, a small bleeding of one ounce or two may prove of the greatest benefit. It is no doubt difficult in some instances to diagnosticate the morbidness which underlies the state of the patient from that of cerebral hemorrhage, but where convulsions are recurring, and the temperature is subnormal, it is wisest to let blood.

In very intimate—in almost inseparable—relation with the convulsions to which I have referred, are those observed in the pregnant and parturient woman. It has sometimes occurred to me that the bond of relationship which binds them most closely to one another, is that of high arterial tension. I have witnessed most severe eclampsia in a case in which there was comparatively little albuminuria, and if we estimate—and I believe that in such cases it is a pretty reliable guide—the extent of damage to the kidney by the amount of albumen thrown down, then we must look for something besides the renal mischief to account for the production of convulsions.

This, I take it, will be found in that normally existing state of pronounced arterial tension which is the constant accompaniment of gestation. The presence of cardiac hypertrophy, increase in renal pressure, increase in the quantity of blood, and probable increase, as mooted by Barnes, in nervous force, all contribute to the production of increase in vascular pressure, and when, superadded to these many separate factors, we have nephritis—probably degenerative in its nature—bringing as its results not only a further and harmful increase in the quantity of blood in the vessels, but most marked deterioration in its quality, then it is readily understood how a minor degree of renal mischief may determine the occurrence of eclampsia.

The best known theories regarding the causation of puerperal convulsions have for their basis this excess in arterial tension, and therefore it might seem *à priori* that in such cases bloodletting would prove useful. And so it does in some, for although in the majority the use of chloroform, chloral, or pilocarpine, remedies possessing the power directly or indirectly of lowering vascular tension, may be found sufficient, there yet exists a minority of cases, in which the form and the gravity of the seizure demand for its safest treatment recourse to venesection.

Marked severity of attack, with extreme congestion of the face, and turgidity of the vessels, as its characteristics; and profound coma, with flushed face, and a hard, long pulse, in the intervals of the seizures, form, maybe, the most reliable guides for such treatment. I well re-

member one such case, a primipara seized within an hour of her delivery with convulsions of such frightful severity as to render their remembrance with me indelible, and how, after chloroform had been used without avail, a free venesection altered at once the whole aspect of her condition. I am happy in this experience, that although all the cases I have seen were not treated by bloodletting, those which were, and these the most severe, made excellent recoveries, and whether due to the fact that such treatment tended to the more speedy cure of the kidney disease, or that they lacked a vital tendency to its development, they all escaped what unhappily came to some of the others, recurrent puerperal nephritis, with its sad tale of disaster.

The importance attaching to the condition of high arterial tension becomes increased by the knowledge of the fact that it may exist independently of disease of the kidney, and that it may prove the cause of such convulsive phenomena as are indistinguishable in their characters from those that mark uræmia. That this depends upon the peculiarities of the cerebral circulation is most probable. It is not easy, as Broadbent has pointed out,<sup>1</sup> to say how convulsions are produced, but if we admit that acute increase in vascular tension has a possible power of causing anæmia of the brain with, perchance for its sequence, a serous effusion in the meninges, and that it may give rise to the occurrence of capillary hemorrhage in its substance, then we can understand how capable it may prove of producing such nerve storms as betoken the occurrence of some hitch in the circulatory balance of the great seat of nervous force. The harm to which it gives rise is, however, not always so startlingly evident, but it is none the less grave; cardiac disease, aneurism, arterial degeneration, these all follow in its train, and render it one of the conditions in which a ready recognition and a fitting treatment must go hand in hand. It has happened to me on several occasions to observe in elderly men, the subjects of gout, how much relief has been brought to somewhat indefinite but most troublesome symptoms by a smart epistaxis.

Last autumn I had under my care a gentleman of sixty, of well-marked gouty tendency, suffering from headache, giddiness, and extreme irritability of temper. He had all the physical signs of high arterial tension, but without evidence of any organic disease. He was treated by calomel and salines as active purgatives, and he was carefully dieted, but with little improvement, until the occurrence of a severe epistaxis brought him entire relief. Then I recognized fully how certainly a moderate bloodletting would have saved him suffering, and myself anxiety concerning him.

His was one of the cases in which there is no existing disease of the

<sup>1</sup> *Lancet*, 1883, vol. i. p. 4 et seq.



kidney, but in which a gouty condition of the blood, coupled maybe with a plethora, led to increase in arterial tension, and, as sometimes happens, to apoplexy as an unhappy sequel.

The term of gestation is not the only period in a woman's life when she may become the subject of high arterial tension. It may come to her in the earlier years which succeed the establishment of menstruation, through continued amenorrhœa, and it may, and very frequently does, during the epoch of the climacteric. Many of the very trying subjective symptoms of which bitter complaint is made at this especial time have their origin in vascular disturbance, and I have noted in some cases how relief to them most certainly followed the action of such remedies as render the pulse softer and more full. But its ill effects may be so pronounced as to endanger life. Here is an instance, the most pronounced I have ever seen, but fraught with instruction :

In the early hours of a morning in last June I received a note from Dr. Graham, of Kirkclinton, asking me to see with him a patient who was thought to have had an apoplectic attack. She was a farmer's wife of forty-five, stout, red-faced, and plethoric. For nearly four months the catamenia, normally large in amount, had disappeared, and latterly she had been short-winded and her respiration very easily distressed. Her doctor had seen her on several occasions, because she had general malaise and headache, but there seemed nothing in her state to provoke anxiety. On the evening preceding my visit he had called, and found her much in her usual state, except that a slight menstrual discharge had made its appearance. At midnight she was discovered to be in a condition of profound coma, and in this state Dr. Graham found her. When we met at her bedside she was better, for she could be roused sufficiently to answer questions, but she was stupid and uncollected. The face was flushed and somewhat congested, her pupils dilated and inactive, her heart slow and heaving in its action, with a *clanging* accentuation of the second sound at the base, and her pulse was hard, full, long, and incompressible. There was a little discharge from the vagina and some urine drawn from the bladder contained a trace of albumen. The albuminuria rendered the diagnosis uncertain, but as the acuteness in arterial tension was unmistakable, we bled her freely from the arm. Nearly thirty ounces were taken and this without faltering of the pulse, and, indeed, before it became large and soft. Then she became fully conscious and made complaint of a little nausea. As her bowels were confined, a brisk saline purge was prescribed and a restricted diet. Next day, her doctor, long detained by matters obstetric, went with some anxiety to visit her. He found her downstairs presiding at the tea-table, perfectly hearty and well. Despite the facts that her appearance and her history negatived the existence of granular kidney, the presence of albumen in the urine rendered me at first suspicious, but it never could be detected at any subsequent examination, and when, a week or two ago, I made inquiry regarding her, I found her in perfect health.

That the albuminuria and the slight uterine discharge had a common origin in the high arterial tension, and that the state of coma in which



she was found followed an unrecognized convulsion are sequences I think very probable. In the existence of acute vascular pressure lay the primary harm, and this harm bloodletting relieved in a manner with which no other remedy could cope. This relief was as evident and striking to those standing around as it was to the medical attendants.

That in cases depending upon menstrual irregularity the excess in tension arises from simple increase in the volume of the circulating fluid is, I think, likely; and hence, in some of them, as happened in the instance just related, bloodletting not only brings relief to urgent symptoms, but it effects a permanent cure.

Here may well end my quest. It is not without due deliberation that I have recorded these views with reference to the value of bloodletting, for, although there has been, of late, a decided reaction in its favor, there still exists a strong prejudice against it, and where many of the wisest and best hold opposite opinions it seems immodest to speak with decisive tone. And yet it is not necessary when we speak with decision to speak presumptuously. The opinions that are mine on this matter have grown slowly, and they, at least, have this possible merit, that as the result of experience and of thought they have become convictions. To some the premises upon which they are based may seem quite inadequate, and the views wrong, but I have, nevertheless, ventured to narrate them, because they are my firm beliefs, faith in which has stood the strong touchstone of practice.

It was a proposition of that wise physician, the late Dr. Peter M. Latham, that the groundwork of rational practice is to understand the value of single indications, and the power of single remedies; and as there seems to be no treatment for which the indications are so decisive—none in which a single one may more surely point the way than for bloodletting—and no single remedy which, in necessary circumstances, possesses so great a power, I will finish, and at the same time point the object of my paper, by a quotation from his writings: "I am persuaded," he says, "that when the physician is called upon to perform great things, even to arrest destructive disease and to save life, his skill in wielding the implements of his art rests mainly upon the right understanding of simple and single indications, and of the remedies which have power to fulfil them."

CARLISLE.

PRECOCIOUS GUMMATA.<sup>1</sup>

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THE close and widespread study of syphilis within the past fifteen years has conclusively shown that the old and dogmatic division of the disease into three sharply marked periods must soon be very much modified, or perhaps even discarded, and that, although the terms primary, secondary, and tertiary, as applied to stages of syphilis, present the advantage of clearness and simplicity in study and description, and may even be clinically true as regards a large number of cases, yet there are very many in which such a division is inappropriate, since we observe in some the so-called tertiary lesions in the secondary period; in others seemingly secondary lesions in the tertiary period, and perhaps coexisting with well-marked lesions of that period; or, again, cases of tertiary lesions concomitant with secondary lesions. To hold, then, that superficial lesions belong to and are only found in the early or secondary period, and that they are followed later on by lesions involving the tissues more profoundly, is in reality to sacrifice facts for simplicity of description. Indeed, one of the as yet unsettled problems of great importance in syphilology is that relating to its periods, classification, and chronology.

One of the main facts which militate against the old division is that which has been so prominently brought forward of late years, namely, that there are many lesions and affections which were formerly looked upon as belonging to the tertiary period, which are very frequently observed to assume a precocious development, appearing more or less early in the secondary period. Thus we not infrequently see within the first year of syphilis destructive ulcerations of various size and depth which we call malignant, precocious syphilides. Not infrequently do we meet with cases of osseous and articular lesions which, under the old division, we can only term precocious since they appear in the so-called secondary stage. Marked instances of early gummatous development are seen plainly in the gumma of the iris, and again severe infiltrations of the pharynx and larynx are not infrequently observed early in the first year of the disease. Then, again, observations made within the last decade have shown that affections of the nervous system, which at one time was thought to be spared by the syphilitic virus, and in later times attacked only in its tertiary stage, may develop within the first six months of syphilitic infection. In considering this subject of the rela-

<sup>1</sup> Read before the American Dermatological Association August 25, 1886.

tionship of secondary to tertiary lesions, that eminent surgeon, Mr. Jonathan Hutchinson,<sup>1</sup> says:

"What has been named a 'gumma' has been supposed to be characteristic of the tertiary stage. Opinions have, however, been changing respecting several, if not all, of these points. Cases have been recognized in which the various conditions referred to were met with so early in the disease, and in such close combinations with each other, that the only explanation seemed to be that the disease had run an unusually rapid course, and had reached its last stage before it had well finished its first. By degrees we are, however, arriving at another interpretation of such facts, and are beginning to see that the old classifications of the phenomena cannot hold their ground, and that we must seek for other characters by which to distinguish the secondary and tertiary stages. Not, indeed, that the old observations are wholly wrong; this would be exceedingly improbable, and its mere assertion would very properly lead to much distrust of any modern conclusion which might seek to supplant them. Speaking loosely, and in a general way, it is still true that visceral affections, gummata, deep ulceration and periostitis belong to the tertiary stage. It is only when these facts are brought forward as if they were constant and sufficient in themselves to form the basis of classification, that we are compelled to make protest."

He then continues:

"Permit me to illustrate what I mean by the citation of a case. A young man, aged twenty-one, too young, let me note, for it to be likely that he ever had syphilis before, was admitted into the London Hospital under my colleague, Dr. Langdon Down. He had still the remains of a hard chancre on him, and he was covered by a papular rash, which was ulcerating in places. The date which he assigned to the beginning of the affection was only four months previously. He died suddenly and unexpectedly. The necropsy showed gummata in both testicles, in the spleen, and in the heart, death having been caused by the softening and ulceration of the latter."

Though Mr. Hutchinson thus shows the shortcomings of the old classification of syphilis, he does not attempt to establish a new one. In this he is, in my judgment, wise, seeing that in our knowledge of the natural history of syphilis there are yet many lacunæ, notably in that of early visceral lesions. In Germany, also, the insufficiencies of the old classification have been treated of in an excellent article by Finger,<sup>2</sup> who, however, has no new one to offer.

Though to-day there are comprehensive descriptions of precocious nervous, osseous, articular, ocular, and superficial ulcerative dermal affections due to syphilis, a systematic description of the clinical history of precocious gummata is wanting.

It must, in justice, here be stated that our knowledge of many of the precocious affections of syphilis is in a large measure due to the writings of that eminent syphilographer, C. Mauriac. His paper, entitled "*Cas de syphilis gommeuse précoce et refractaire à iodure de potassium*," Paris, 1874, is, according to my reading, the first contribution to the

<sup>1</sup> Lettsomian Lectures on Some Moot Points in the Natural History of Syphilis. *British Medical Journal*, January 23, 1886.

<sup>2</sup> Ueber die Koexistenz der sogenannten secundären und tertiären Syphilisformen. *Wien. med. Wochenschrift*, Nos. 1 and 3, 1882.

subject of precocious gummata, and this, with his latter paper, "*Memoire sur les affections précoce du tissu cellulaire subcutanée*,"<sup>1</sup> constitutes up to this time the literature of this form of eruption.

In the present essay the divisions and clinical descriptions are based wholly on my own observation and study during a period of many years, aided at times by the facts observed by Mauriac. In many points my experience accords with that of this painstaking observer, while in others it is more or less at variance.

I propose to present the clinical histories of a selected number of my cases, from which I think I can trace a clear and satisfactory description of these not common nor yet infrequent eruptions.

My studies have convinced me that there are three forms of the precocious gummata: The first, the generalized form; the second, the localized form; and the third, the neurotic form, which in some of its features resembles erythema nodosum. Of each of these three forms, moreover, there are two varieties: a resolute, or non-ulcerative, and an ulcerative variety.

## I. THE GENERALIZED FORM OF PRECOCIOUS GUMMATA.

A clear idea of this form of syphilide is presented by the following case:

CASE I.—A merchant, aged thirty-six, came under my observation in May, 1885. He was a tall, thin man, of exceedingly nervous temperament, never very strong, who continually overtaxed himself mentally and physically, and subordinated to business every pleasure and relaxation. Excepting several attacks of gonorrhœa, and more or less prolonged periods of extreme debility, he had had no real sickness in his life. He came of excellent stock. In January, 1885, he had a large indurated chancre, with marked inguinal adenopathy, which was followed late in February by a roseola and papular syphilide, fall of hair, rheumatoid pains, emaciation, and asthenia. For these he had been treated by an out-of-town physician in a proper manner.

Late in May, three months after the evolution of the secondary period of syphilis, he came to me, at the advice of his physician, presenting the following symptoms. On the scalp a tendency to loss of hair, mucous patches in pharynx, and over the body a declining papular syphilide, interspersed with slight maculations of what had been a deep-tinted roseola. Amid these retrogressing lesions was the eruption which is of interest in this paper. Over the nucha and the shoulders, on the outer aspect of the arms, particularly over the elbow, over the gluteal region, quite copiously on the outer and anterior part of the thighs and legs, and sparsely on the inner aspect of these members was scattered an eruption of tubercles, varying in size from a lima bean to a walnut, which numbered by actual count more than forty. These tumors were seated firmly in the skin, involving its whole thickness, besides some of its

<sup>1</sup> *Annales de Dermatologie et de Syphiligraphie*, 1880 and 1881, and *Leçons sur les Maladies Vénériennes*, Paris, 1883



underlying connective tissue, were easily movable, and sharply circumscribed. They were of a dull red color, some of them level with the plane of the skin, while others, and particularly the larger ones, were in a moderate degree salient. They were in general covered with normal epithelium.

Amid these well-developed tumors were fully fifteen very minute ones, of which several could not be seen by the naked eye, but on searching for them presented to the tip of the finger a feeling of movable, circumscribed infiltration in the deeper portion of the derma. Others of these incipient tubercles, being like those just described, of the size of a pea, showed, upon examination, that they were infiltrations which had begun coincidently in the skin and connective tissue, while it was evident that in the former the morbid process began in the superficial layers of the connective tissue, and that they gradually contracted adhesions with and invaded the whole derma. The only further point of interest of this case in this connection, is that a few of the larger and older tubercles underwent slight and superficial ulceration, while the majority were cured by local and constitutional treatment within a month.

The period of time occupied by the evolution of the eruption up to the date of my first examination was, as nearly as could be determined, two weeks. During the whole course of the eruption the subjective symptoms had been very slight and were limited to a feeling of slight uneasiness and impediment to locomotion.

I may here add that the question in the mind of the attending physician, who was a very intelligent man, I only seeing the case at varying intervals in consultation, was, whether the eruption I have just described was really of syphilitic origin, or whether it was a coincident furunculosis of low grade and of aborted form. He very pertinently remarked that it seemed strange that such superficial lesions as roseola, papules, etc., should be followed so quickly by lesions so deep-seated as were these gummatous infiltrations.

The foregoing case may be taken as typical of the first, earliest, and most common form of the precocious gummata. It will be noted that while in its general and symmetrical distribution the eruption presented the features of the early and, we may perhaps say, exanthematic syphilides in the intensity and profundity of the morbid process, it partakes of the character of the late or tertiary lesions. In my experience this particular form of eruption, while not rare, is not very common. I usually see four or five of such cases every year in hospital and two or three in private practice.

These cases present considerable uniformity, and although to the experienced physician they usually offer no difficulty of diagnosis, I have often seen them prove stumbling blocks to the younger men and sometimes even to older ones.

This eruption may appear as early as the second month, and in the third, fourth, and sixth. I have observed that the earlier the date of

the appearance in general the more extensive is the eruption and the more numerous the gummatous tumors, and that while it is the rule to see many of them, thirty, forty, or even sixty or seventy, cases will be observed when as small a number as fifteen or twenty tumors are present. Not infrequently do we see the evolution of the eruption following or even coincidently with the existence of a general roseolous, a papular, or even pustular syphilide. It is not uncommon to find coincident gummy infiltration into the pharyngeal walls or into the mucous membrane of the roof of the mouth, or even less intense lesions of these parts. Serous and gummous iritis, neuralgic phenomena, even such grave affections as hemiplegia, paraplegia, and minor palsies may also be observed to be coincident with or follow closely upon the evolution of this eruption. Many observations which I have made have convinced me that in most cases there is an accompanying well-marked febrile movement just preceding and during the outbreak. In some of the milder cases the temperature may be elevated from one to two degrees, while in others, particularly in those of extensive eruption, the thermometer registers in the evening  $102^{\circ}$  or  $103^{\circ}$  F., with a decline of two or more degrees in the morning. Then, again, the fever may be slight and continuous, while in cases attended with much cachexia, a continuous high fever is occasionally observed.

This form of gummatous eruption attacks both males and females in about equal numbers; my own observations tend to convince me that some condition of lowered vitality or impaired nutrition is at the root of it and of other forms of early gummata. Thus I have met with it in persons of naturally poor fibre, in those of studious and sedentary habits, in persons exhausted by the cares and confinements of business, and last, but foremost, in those who are habituated to the excessive use of alcoholics. If the question was put to me, "In whom do you most frequently observe severe and precocious syphilides?" I should answer promptly, first, in those whose nutrition is impaired by alcohol; second, in those who suffer from renal and hepatic diseases; and, third, in those having these visceral lesions and, besides, who have been addicted to alcoholics. I am not as much impressed as some observers are as to the malignancy of syphilis in strumous subjects. Very many such patients become sorely afflicted by syphilis, yet in many that disease runs its course unattended by severe precocious lesions or even with late lesions of much severity. I have reached the conclusion from extended observation that in the so-called scrofulous person, provided his or her habits of life are good, there is not an unvarying tendency to malignant precocious syphilis. It is true, I have seen early and malignant forms of syphilis in strumous persons, but not in such numbers as to warrant me in placing struma in the front rank of its causes.

This form of eruption is found in both old and young, though my sta-

tistics show that the greater number of my patients were between twenty and thirty-five and after fifty years. My opinion is in accord with most syphilographers that syphilis in persons beyond fifty years of age is frequently severe; that its lesions are often precocious, grave, and extensive; and that the diathesis has a tendency to modify, to engraft itself upon and often to intensify previous morbid processes or affections, local or general. I have repeatedly seen instances of this malignant action, and I have very frequently seen the form of precocious syphilide now under consideration in old subjects.

Malaria very frequently acts as a formidable complication of syphilis, and some of the most rebellious cases that I have treated were in persons whose systems, prior to syphilitic infection, had been debilitated by its virus. In such cases I think that we more frequently see precocious cerebral and nervous symptoms, and not infrequently early hepatic disturbances, of greater or less severity. In these cases of mixed diatheses, however, the syphilides often run an active and severe course, and precocious gummata not infrequently attack them.

The clinical history of this form of precocious syphilide then is as follows: As early as the eighth week of infection, rarely earlier, the patient notices either small circumscribed swellings under the skin, generally unattended with pain and only perceptible to the touch, or this stage of the eruption may escape him and his attention is at first arrested by a number of bright red spots. Quite frequently the patient comes with the statement that blind boils are breaking out all over him. Examined early in their history these gummata are found to be round tumors of the size of a bean, deeply set in the skin, having a bright red color which, at the first, is dissipated by pressure, but becoming deeper, more sombre and permanent in color later on. They increase peripherally quite rapidly, so that within a week or ten days they may attain an area of an inch, or an inch and a half. Then again their growth may be slower. In general a goodly number of tumors appear scattered symmetrically over the whole body. As they grow they are followed by new ones which come along with greater or less rapidity, in proportion as internal medication is pushed. If a correct diagnosis is at once made and appropriate treatment instituted, the first crop may be the only one and that may be promptly dissipated. Unaffected by medicine, their evolution continues and in a fortnight the arms, forearms, perhaps the scapular region, not infrequently, but not as a rule, the back and anterior surface of the trunk, the gluteal regions, thighs, and legs are invaded by these tumors.

The course of these gummata is, in general, quite regular and not subject to great variation. When developed they present a quite firm sensation and this may be termed the period of condensation. As they grow older the red color becomes rather coppery, and while the periphery



of the tumor may or may not seem firm, the central portions appear softer to the touch, conveying the impression that the tissues are permeated with a thick fluid. This we may denominate the stage of softening, and is found to be of varying degrees in different cases. In some instances there is simply a soft and yielding sensation conveyed to the finger tip, while in others a feeling of slight fluctuation is noticed. To the inexperienced in the latter case these tumors may give the impression of being abscesses and suggest the use of the knife. But such a procedure should not be resorted to, since resolution may take place under the influence of treatment, even when the condition of softening is well marked. In the majority of the cases there is not abscess formation, but rather a liquefaction of the gummy infiltration, which is in general promptly absorbed. In the non-ulcerating or resolute variety of precocious gummata, which we are now considering, the further progress of the tumors is as follows: They gradually become flatter, the borders melt away slowly, and the color *pari passu* fades until the normal hue or a coppery pigmentation of the skin is reached, which occurs soonest on the trunk and upper extremities and latest on the legs. On the latter situation the stage of softening may continue until the stage of ulceration sets in. Here, also, these tumors frequently take on inflammatory action when complicated with varicose veins, with œdema and chronic eczema and erysipelas. The time occupied in the full development of these tumors is usually from ten days to two weeks, and after that their period of duration is variable. They may, under treatment and care, promptly retrogress, and again may remain in an indolent condition in the second stage indefinitely. The traces left by them are generally very slight and not permanent, being simply slight hyperæmia and scaling and coppery pigmentation. Then again, in long-standing resolute cases, after absorption has taken place distinct loss of tissue may be noticed in a depressed cicatrix, which, however, is not as profound as those left by the gummata of later periods. Not uncommonly, new and sparse crops of tumors appear while the general eruption is in process of absorption.

Having thus quite fully described the non-ulcerative or resolute form of this very precocious gummatous eruption, a few words will suffice to bring out the features of the ulcerative variety. While in the first variety there is usually little or no tendency in the tumors to necrobiotic action, in the second variety this condition is seen quite early. The stage of condensation is very short, and softening in a marked degree is observed in a few days. The centre of the tumors assumes a dark red color in one or in several spots, and a sensation of fluid under the epidermis is distinctly made out. Then slight ulceration may occur in spots, often at the openings of the hair and sebaceous follicles, and very soon the epidermal roof of the tumor melts away, and we soon see



the gummatous ulcer with its slightly thickened, reddened, undermined, and perhaps everted edges, and its floor of a greenish-red, bathed in an unhealthy sanious pus. As a rule, however, these ulcers are more superficial than the later ones. Their floor is less deep, the edges less undermined and everted, and the whole appearance indicates that the destruction is less profound. I have seen instances of this variety in which as many as forty tumors underwent degeneration.

Having reached the stage of ulceration, the further course is indefinite, and it depends entirely upon the treatment, external and internal, which is adopted. The concomitant symptoms of this variety of the gummous syphilide are in general like those of the resolute variety, only that they are usually more intense and accentuated. The fever is higher, the malaise more pronounced, and the general condition of the patient rather worse.

Usually there is no difficulty of diagnosis of this variety of precocious gummata. The infection is so recent that a history of syphilis is easily obtained and then all doubt as to the nature of the tumors is removed. I have seen them, however, mistaken for aborted furuncles and regarded as rheumatic tumors, as scrofulous swellings, and in a case in which the initial lesion was seated on the index finger and was accompanied by severe constitutional symptoms and an active angio-leucitis of the arm they were thought to be the result of purulent infection.

## II. THE LOCALIZED FORM.

The second variety of precocious gummata usually appears somewhat later than the one just described. In exceptional cases I have seen the eruption as early as the third month of syphilis, though my notes show that in the greater number of cases the date of appearance was the fifth, sixth, or eighth month of infection and even as late as one year. Like the first variety, the evolution of these tumors is aphlegmasiac, rather more insidious and indolent than that of the first variety, and, in short, partaking of their characteristics to a certain extent and, also, of those of the gummata of the tertiary period.

In the second variety, also, we find some cases in which resolution takes place, while in others the stage of softening goes on to ulceration. While in the first variety the tumors are smaller, more numerous, and more copiously and symmetrically distributed, in the second they are, as a rule, larger, less numerous, and, though generally symmetrically placed, occasionally they are unsymmetrical, existing upon one region and absent on its fellow of the opposite side.

As a rule, they are met with in the same class of persons as the first variety is, namely, in the aged, and those given to excess in alcoholics, in persons of strumous tendency, in subjects debilitated by any exhausting cause or adynamic influence, such, for instance, as visceral disease,

fevers, pneumonia, diphtheria, etc., and in those reduced by chronic malaria. Then, again, I have seen this eruption in patients who could not be classed in any of these categories, who had never had any sickness—yet, as they remarked, had never been strong; in short, persons of poor fibre. While there may be a slight prodromal or accompanying fever, it is usually absent, and the patients may not complain of any unusual intensification of their morbid condition.

The following case will answer well as a prototype of this second form of precocious syphilide in its full development; while very brief notes of other cases will be of service in showing its more restricted and less symmetrical distribution.

CASE II.—A female, aged twenty-four, a blonde, fat and flabby, came under my observation at Charity Hospital in October, 1883. She had been in the hospital at different times for gonorrhœa and chancroids, was a woman of the town, and addicted to drink and dissipation. In April, 1883, she had an insignificant ulcer at the fourchette, which was followed by inguinal adenopathy, fall of hair, a severe attack of mucous patches of mouth, throat, and larynx, and a disseminated and very copious papulo-pustular syphilide. She was treated at a dispensary, but was negligent in following advice, and generally careless of her health. In September, five months after infection, she presented evidence over the whole body of a small miliary papular syphilide.

She entered the hospital on account of a number of tumors on her legs which began to appear about a week before. At the examination I found, on the outer aspect of the forearms, over both gluteal regions, and on the lower half of the leg, a number of tumors. These were oval in shape, following the longitudinal axis of the limbs, but obliquely transverse at the gluteal regions, slightly elevated, and were felt to involve the whole thickness of the skin, and part of its subcutaneous tissue. Their color was a pronounced red, tending toward brown; they were covered with a tolerably perfect epidermis, and surrounded on the legs by a bright red areola. Elsewhere the deep red color of the tumors stopped sharply at their borders. The largest of them, which were on the outer side of the legs, were about two and a half inches in length, by one and a half in breadth, while the others varied in size until the smallest were reached, which were less than an inch long. In all there were about fourteen. The woman's stomach was so much deranged, and her health so debilitated, that mercury in any form, or by any method of administration, was temporarily out of the question. The treatment was, therefore, directed to improvement of the appetite, and invigoration of the system.

While under this course, several subcutaneous tumors developed quite quickly, say within ten days, on the outer aspects of both the forearms and the legs. They could be distinctly felt at first as localized, sharply limited infiltrations, without any subjective symptoms whatever. In this condition they were followed carefully from day to day, when in two weeks they had attained an area of an inch and a half by one inch, having in the meantime fused themselves with the skin lying above them, and come to present features essentially like those of their predecessors. The patient presented very slight febrile symptoms, complained

of no pain, but simply a tense feeling in the arms and legs. Later on, under a mixed treatment, these tumors slowly disappeared, having in the meantime been increased by the addition of four more. In their fully developed state—that is, when about two weeks old—they were hard and firm, but later on, they became softer, especially in their central portion, producing a very slight sensation of fluctuation, or, perhaps, I might say, boggiess of the tissues. They never advanced toward ulceration further than this. The redness grew more brownish, and then gradually faded, until at last, in the more dependent ones, slight pigmentation remained, while, in the remaining, total resolution occurred without leaving any trace. The patient was under observation for ten weeks.

In contrast with this case of general and symmetrical distribution, the following are of interest:

CASE III.—A female, aged twenty-nine, in the seventh month of syphilis, had several such tumors on the right leg, two on the left arm, and two on the scalp, over the right temporo-parietal region.

CASE IV.—A man, aged twenty, six months after infection had several tumors on the legs, one on the right side of the forehead, and one on the chin.

CASE V.—A female, aged forty-five, in the tenth month of syphilis, had several tumors on the outer side of both forearms, and one on the left parotid region and infiltration into the soft palate.

The clinical history of this variety of gummatous syphilis is so similar to that of the first that extended description is unnecessary. The appearance of the tumors is the same, except that they are usually larger, perhaps not as much elevated as those of the first form. There is the same stage of condensation, which is slightly longer, then follows that of softening, which is even more aphlegmasic than in the first form. On the legs such complications as chronic eczema, phthiriasis, œdema, varicose veins, and erysipelas, often much modify and intensify the course of these tumors. If resolution takes place, the same process and features are observed as I have already described. If ulceration occurs we find the same softening in one or more central spots, which become of a deep red or black color, then the gradual melting away of the skin until the well-marked gummatous ulcer is left. As in the first variety all the tumors may undergo this necrobiotic action, so in this form one or more may thus succumb, and generally those on the legs. The resulting ulcers are usually large and deep, and correspondingly slower in healing. On the legs this eruption is frequently accompanied by a sensation of uneasiness and heat, and locomotion is more difficult. Elsewhere little, if any, discomfort is experienced, except on the forearms, where a feeling of tension is often complained of.

In general, the diagnosis of this form of syphilide is easy, particularly when the tumors are numerous, and symmetrically distributed. In the cases in which the tumors are sparse and localized, errors in diagnosis



are not infrequently made. It is important to bear in mind that the regions of the head and face are particularly susceptible to this form of precocious syphilide. When thus seated in these regions it is quite frequently found that there is also infiltration into the pharyngeal walls, and perhaps into the mucous membrane of the mouth.

I would not be understood as limiting the date of evolution of this syphilide to the first year of syphilis, since it unquestionably appears later. As the diathesis grows old, however, the eruption generally is less copious, less symmetrical, and is more insidious, aphlegmasic, and limited in extent, becoming more and more like the tertiary form.

### III. THE NEUROTIC FORM, PRESENTING POINTS OF RESEMBLANCE TO ERYTHEMA NODOSUM.

CASE VI.—A female, thirty-seven years old, married, mother of three children, having suffered from eczema and severe attacks of supra-orbital neuralgia, accompanied by gastric disorder for years, was infected with syphilis by her husband in the winter of 1881. She was a thick-set, fat, and phlegmatic lady, and had never been robust and strong. The secondary manifestations were quite severe, a roseola being soon followed by a copious papular syphilide, distressing angina, and rheumatoid pains. She lived in a neighboring city and was carefully treated with mercurials by her family physician.

In the month of February, 1882, she was brought to me and presented the following symptoms: She had complained of excruciating nocturnal cephalalgia for about ten days. The cervical, epitrochlear, and inguinal ganglia were much enlarged and over the arms and trunk was a declining papular syphilide. The chief object of her visit was to determine the nature of a number of swellings on various portions of the body. On the outer aspect of the shoulders were several oval tumors of a bright rosy red, slightly elevated and convex, having a firm consistence and sharply margined. Their length was three-quarters of an inch, their diameter half an inch. On the infra-clavicular regions were two tumors, symmetrically placed, slightly larger than the others, and on each forearm were two similar tumors. On each of the legs, on the antero-external surface, were several more of larger size, distinctly elevated, flat, and surrounded by an œdematous margin. Their surfaces were firm and the epidermis quite tense. The color was of a sombre red. The story told by the patient was, that ten days previously, when suffering from severe headache, which was worse at night, she noticed a sense of heat and a soreness as if from a blow or a bruise in the forearms, shoulders, and more severely in the legs. On rubbing these regions she felt lumps under the skin, which, in two or three days, developed into the red tumors just described. While these tumors were forming she was further affected with lancinating pains of intermittent character in the outer aspect of both thighs, beginning at the anterior superior spine of the ilia and running down to the knee. Examination at the time showed that under the skin, on the antero-external surface of both thighs, were two irregular oval plaques of induration fully two inches long. Above them the skin was freely movable and by their inferior surface they were free. No redness of the skin was seen at this time.



I had the opportunity of examining the progress of this case very carefully for a month after the February consultation. The patient was weak, debilitated, and rendered almost hysterically nervous from the suffering during the day by the flushing and lancinating pains and from these combined with headache at night. The tumors were exquisitely painful and the slightest touch was dreaded. It was only after the fourth day, during which time the patient had taken bromide of potassium and codeia, that I could make a thorough examination of the tumors, and I found from the surface thermometer a temperature of  $98\frac{3}{4}^{\circ}$  F. on the tumors. During this period of illness she had lost much flesh. As soon as the pain had been relieved, the codeia was stopped and the bromide, combined with the iodide of potassium, was given in doses, beginning with thirty grains of the bromide and ten of the iodide, three times daily. Besides this, forty grains of mercurial ointment were rubbed into the groins, armpits, and legs near the tumors daily for about ten days. The iodide was pushed to forty grains, thrice daily.

The further history of the tumors is interesting and peculiar. The rosy red deepened into a sombre red, and then in the centre of each, which was slightly convex, the redness gradually paled until a color similar to white wax was left. The tumors then presented a very striking appearance: about one-third of their whole extent and sharply limited to their centres, they were of this waxy color, which was surrounded by an areola of various shades, constituting a peculiar play of colors, such as is often seen in erythema nodosum, and which is admirably shown in plate No. 3 of the late Tilbury Fox's *Atlas of Skin Diseases*. The differences, though, if carefully studied, were well marked. There was a more aphlegmasic, indolent, and subacute appearance to the eruption of the patient. The various shades of circumferential redness were more sombre, the tumors which then could be examined were more sharply circumscribed, and there was decidedly less surface heat than in simple erythema nodosum. Yet I can readily see how an error could have been made.

In proportion as the bromide and iodide were pushed and the mercurial inunctions continued, the nutrition of the patient improved, the appetite returned, the headache ceased, and the neuralgic pains grew less, so that on the twentieth day after the institution of the treatment the condition of the patient was very favorable. The tumors slowly underwent absorption. The waxy colored centre increased peripherally as the variegated and sombre red areola grew less, until in a month the site of the tumors showed only traces of slight hyperæmia. But for fully three weeks after the disappearance of the surface changes distinct nodules, non-adherent to the skin above and the fasciæ beneath, could be distinctly felt. The subcutaneous tumors on the thighs were aborted by the treatment. At first the pain grew less and soon their size diminished, until in about a month they could be no longer felt.

The date of invasion of this eruption was four months after infection.

In the spring and summer of the year 1879, while attending physician to the class of skin diseases at Bellevue Hospital, I had under my care a woman whose case was to me and to my colleague, the late Professor Bumstead, unusual and remarkable.

CASE VII.—The patient was a married woman, twenty-five years of age, of dark complexion, very thin and sallow, who had long lived in the South and suffered from malaria, chiefly in the form of remittent fever and neuralgic pains in the head. She had been infected with syphilis in April and had active and extensive papulo-pustular eruption, double iritis, and nodes on the cranium and on both ulnæ, near the elbow-joint. For these she was treated and was in August free from lesions, when she began to complain of an atrocious nocturnal cephalalgia. This was followed by pain in the larger joints and a marked hyperæsthesia in both legs. Coincidentally there were malaise, loss of appetite, insomnia, and, as she tersely described it, a generally wretched condition. After three days of this suffering she observed some red patches or swellings on the legs, chiefly on the middle and upper thirds. I saw her two days after the invasion of this eruption and found her scarcely able to walk. Both legs were swollen, red, and œdematous. On each were fully six large plaques of infiltrated skin. The color was of a deep red, the epidermis tense and shining, and slightly elevated above the intervening skin, which was also œdematous and less red than the tumors. There were two large oval tumors on the outer surface of the thighs. These lesions were hard and firm to the touch and so exquisitely sensitive that it was with much difficulty that an examination could be made. The infiltrations increased in extent, became more salient, while the deep red color became of a bluish-black, exactly like a severe contusion. The intensity of the discoloration was greatest in the centre and shading off slightly toward the periphery. About fourteen days elapsed between the onset of the skin lesions and their full development. At that time the severe neuralgic and rheumatoid symptoms were much relieved and the general condition of the patient better. I was at that time disposed to attribute the relief of the neurotic condition to the large doses of bromide which were given, but subsequent observation has shown me that in some cases in proportion as the eruption matures the suffering grows less. Mauriac has also observed this fact. A point of interest in this case was that several of the tumors so increased in size that they fused together and resulted in patches of infiltration nearly six inches in diameter. Under the mixed treatment and soothing applications resolution took place slowly, except in two of the tumors seated on the lower third of each leg, which softened in the centre, ulcerated, and presented the characteristics of ulcerating gummata.

The period of evolution of this eruption was about fourteen days, the subsequent stationary period was a month for the resolute tumors and about two months for the ulcerative ones. The date of evolution of the eruption was four and a half months. Very little scarring was observable on the sites of the ulcers.

CASE VIII. was that of a gentleman thirty-two years old, who was under my care in the summer of 1885. He contracted syphilis while abroad and had a small ephemeral initial lesion, followed by very mild secondary manifestations. In the fifth month of his syphilis he became much worried by business reverses and was forced to undergo severe physical and mental strain. In this condition, being a thin, not very strong person, he began to suffer from nocturnal cephalalgia, intermittent neuralgia of several of the left intercostal and of both anterior crural nerves. About a week after the onset of this neuralgic condition he noticed on each leg a number of bright red swellings. These increased

in size and followed precisely the same course as was observed in the first cases. I found the same hyperæsthetic tumors, with a waxy looking centre and the variegated areola. Rather less than fourteen days elapsed from the time of invasion to the full development of the eruption. He was cured by local inunctions and iodide of potassium internally.

CASE IX. was that of a woman forty-eight years of age, who was of robust build, but had suffered at intervals during the last ten years with rheumatism. She was much given to alcoholic excess. Ten weeks after infection, which was in December, 1882, coincidently with a copious roseola, she was attacked by an eruption of round and oval tumors on the forearms, legs, and hypogastrium. The deep red color became deeper until a hemorrhagic appearance was presented. Then paling begun in the centre, being first of a bluish-green, then dark green, then of a brownish-yellow, until entire resolution was effected in two months.

CASE X. was also that of a woman fifty-three years of age, seen by me in the fall of 1884. She had borne twelve children in fifteen years and thought that the ill health from which she had suffered since she was forty years of age was the result of these frequent pregnancies. She suffered also from subacute bronchitis which had followed pneumonia. Three months after infection she had a copious eruption of the tumors such as I have already described, which were the seat of neuralgia and surrounded by hyperæsthetic skin. Resolution did not take place, the tumors softened and broke down into typical gummatus ulcers, which were healed in three months, during which time a small crop of new tumors developed. Very superficial scars were left.

These five cases, I think, may be taken as typical illustrations of the third form of precocious gummata. The date of evolution of the eruption was respectively four, four and a half, two and a half, and three months after infection, while in Mauriac's cases the eruption began at two months in three cases, four and a half in one, and at nine months in the fifth. In my cases it occurred in women four times and in men once, while in Mauriac's cases three times in men and twice in women. In my cases the ages of the patients were thirty-seven, twenty-five, thirty-two, forty-eight, and fifty-three, while those of Mauriac were thirty-eight, forty-seven, twenty-three, and thirty-four. So that in no case has it thus far been found earlier than the twenty-third year, nor later than the fifty-third.

The clinical history of this form of syphilide has an individuality of its own. In the very early months of the diathesis, either in the stationary period of an early syphilide or at its decline, generally preceded or accompanied by severe neuralgic symptoms involving the facial or cranial, intercostal, anterior crural or, in fact, in any cutaneous nerve, by severe cephalalgia, continuous or nocturnal; by rheumatoid pains in muscles or joints, and by general malaise and debility, this eruption makes its appearance with more or less promptitude and develops quite rapidly. In some instances the invasion is very acute, so that at the end of a week



we may find fully developed tumors an inch or two long, in others and in the majority of instances the development is slower and nearly two weeks elapse. Besides the general neuralgic symptoms, local pains on the site of the lesions or in the whole territory on which they are developed are experienced. These may be continuous or intermittent and in some cases are as excruciating as in severe herpes zoster. They are described as flashing, burning, lancinating, and are sometimes said to resemble those of an abscess. In some instances the sufferings are less after the evolution of the syphilide, but in the majority of the cases the tumors throughout their course are the seat of exceeding hyperæsthesia and patients shrink with terror from their palpation. Besides these phenomena we generally find a moderate febrile movement, an evening temperature of  $100^{\circ}$  or  $101^{\circ}$  F., and in the very severe cases as high as  $104^{\circ}$ ; emaciation, want of appetite, and all their concomitant symptoms. The seats of predilection are the forearms and legs, but the tumors are also found on the shoulders, arms, thighs, chest, and trunk. As a result of the pain, swelling, and tension, there are more or less discomfort, stiffness, impairment of motion, even to the extent of a pseudo-paralysis in the arms and legs.

The eruption consists of two orders of lesions: first, tumors or nodosities seated in the subcutaneous tissue and freely movable under the skin and over the fasciæ, though as they increase they may contract adhesions on both surfaces; second, oval or round tumors, or irregular plaques from fusion of tumors. In my experience the subcutaneous nodosities occur much less frequently than the tumors, while Mauriac seems to regard them as almost constant accompaniments to the eruption. The tumors begin by infiltration in the deeper portions of the skin and its contiguous connective tissue. When first seen they are of a bright red, rather sharply circumscribed, and painful. They quite rapidly increase in size into round or oval swellings, slightly raised and convex. In some cases the bright red rapidly becomes darkened until a blackish-red or decidedly ecchymotic appearance is seen, while in others it is of a very deep red, similar to what we see in erythema nodosum. In some cases again the red centre pales and becomes the color of white wax or of a billiard ball, while the deep red border remains in various stages of intensity, consisting of a commingling or play of colors such as we see following a bruise or erythema nodosum. In most of the cases resolution takes place, and there are but two stages: the first, that of condensation; the second, that in which softening takes place, which may, but does not invariably end in resolution. Mauriac is very positive in his assertion that resolution always takes place. In two of my cases ulceration followed softening, and in a case of Dr. Bronson's I observed this same result.

In my Case VII., observed in 1879, ulceration took place and its



occurrence convinced my late colleague, Dr. Bumstead, who watched the case with me, that the eruption which had so puzzled us, in which we leaned to the opinion at first that it was a case of intercurrent erythema nodosum, was really a precocious and then anomalous form of gummata. The ulcerations which follow the breaking down of these tumors present all of the characters of the late gummata, only in a more superficial degree. Their edges are usually not quite as thick nor are their floors as deep, but otherwise the appearances are the same and their subsequent course is usually aphlegmasic and chronic. In exceptional cases general inflammation and swelling attacks a limb or limbs the seat of these tumors, and the suffering is thereby intensified. The tumors are usually symmetrically distributed and remain isolated with little tendency to coalescence. In some cases after being fully formed they may take on renewed action, enlarge, and become fused together.

I was much surprised at the cicatrices following the tumors which underwent degeneration. The extent and depth of the process led me to think that much loss of tissue would result, such as we find in late gummata. But, on the contrary, the resulting cicatrices were comparatively slight and it was evident that great destruction of the skin had not occurred.

In all cases of precocious gummata, the use of iodide of potassium is indicated, either combined with a mercurial or with the use of inunctions of mercurial ointment.

Such, then, is a quite comprehensive description of an eruption which Mauriac, who is the only author who has previously described it, has called syphilitic erythema nodosum. I am utterly opposed to the names of skin diseases, such as lichen, eczema, psoriasis, lupus, etc., with the adjective syphilitic being used to signify eruptions due to the diathesis, since nothing but confusion and inaccuracy can result from such a nomenclature. There is every reason against and none in favor of calling this eruption by Mauriac's title. It is a precocious gumma presenting certain resemblances in its mode of invasion, course, and appearances to the erythema nodosum. The clinical history of the simple eruption is different from that of the specific. In the latter there is the history of recent infection, and usually a coexistence of declining or active syphilitic manifestation. The febrile symptoms of the early gummata are usually not as pronounced as those accompanying the simple eruption, nor is its invasion quite as sudden and rapid as in erythema nodosum, it is more aphlegmasic. In the syphilitic eruption the nervous symptoms are usually much more severe than in the simple form. Should doubt exist in the mind of the observer early in the history of the eruption, as the evolution progresses, and with the history of the case before him, with its more chronic and aphlegmasic course, and its rebelliousness to simple treatment, it will soon be dispelled. The

fact that these tumors break down and take on the appearances and run the course of typical gummata, to my mind, proves beyond doubt their syphilitic origin and nature.

The coincidence of erythema multiforme with syphilis has been observed by Danielssen,<sup>1</sup> Lipp,<sup>2</sup> and Finger,<sup>3</sup> and has been the subject of a recent paper by Bronson,<sup>4</sup> and beyond the fact that in such cases syphilis usually runs a severe course, as I myself have observed, little which is definite or practical has been evolved. The consensus of opinion concerning this coincidence seems to be that these symptoms are the result of angio-neuritic disturbances, and though due to some occult influence of the syphilitic diathesis, are not pathognomonic of the disease. Bronson goes still further in holding that, though they may begin as simple eruptions, they may later on assume a true syphilitic nature.

I am firmly of the opinion, for reasons already given, that the precocious neurotic gummata are purely of syphilitic origin and nature, and not in any sense intercurrent simple eruptions. As in the palate, throat, iris, and periosteum there is often precocious gummatous infiltration, so in the subcutaneous connective tissue of the skin, which is essentially the one upon which the activity of syphilis is spent, may this precocious development take place. In syphilis, as in sarcoma and leprosy, while in general its new growths are slow, aphlegmasic, localized and chronic, in exceptional cases they may be precocious, generalized, and very active.

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## BACTERIOLOGY.

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(FIFTH PAPER.)

### II. STUDY OF BACTERIA BY MEANS OF CULTIVATION.

THE two chief aims in carrying on cultivations of a definite species of bacterium are in the first place to get it pure, and in the second place to keep it pure. The methods of getting a pure cultivation and also the methods of keeping it pure, differ under different circumstances, and, therefore, will be best described as occasion arises; but there are certain

<sup>1</sup> Norsk Magaz. f. Laegervidsk, iv. 6. Two notes by Finger.

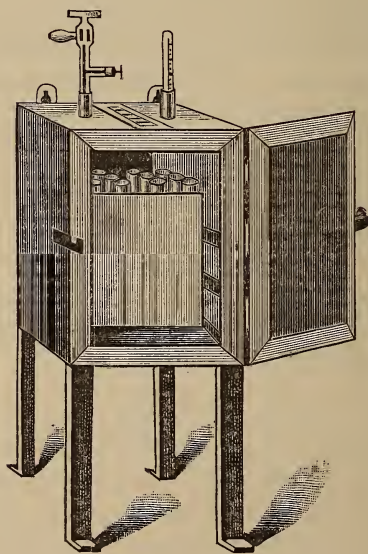
<sup>2</sup> Archiv für Dermatologie und Syphilis, 1871, vol. iv. page 221.

<sup>3</sup> Ueber den Zusammenhang der multiformen Erytheme mit dem Syphilis-Process. Prager med. Wochenschrift, 1882, p. 262.

<sup>4</sup> Erythema Syphiliticum. Medical Record, September 4, 1886.

points in connection with the second aim which are common to all cultivations. As dust is everywhere, both floating in the air and settled on surrounding objects, and as dust contains large numbers of bacteria or their spores, it follows that all vessels and materials employed in the cultivation and preservation of bacteria are already contaminated. Hence the problem of keeping a cultivation pure resolves itself into two parts—(a) the destruction of the microorganisms primarily existing in the vessels and cultivating materials, and (b) the prevention of access of new ones. The first thing that must be done then, in connection with cultivations, is to disinfect or sterilize all the vessels employed, and to do this in such a manner that they cannot become reinfected before use. This is done, for the most part, by heat. It has been found, experimentally, that dry heat at the temperature of from  $140^{\circ}$  to  $150^{\circ}$  C., continued for two to three hours, effectually destroys all bacteria and spores. Hence all tubes, flasks, and glass vessels in general which will afterward contain cultivating materials, are kept at this temperature for three hours, and, as in the case of tubes or flasks dust might enter during cooling or afterward, their orifices are plugged firmly beforehand with

FIG. 1.



Hot box containing a crate with tubes, and fitted with a thermometer and thermo-regulator.

cotton-wool. It is best to use absorbent wool, because the ordinary wool becomes brown and more brittle than the other. Various kinds of apparatus are used for heating the vessels, of which one is shown in the accompanying sketch (Fig. 1). It consists of a double walled vessel, the outer wall being open at the bottom and there being also a hole at

the top. The door is also double. The gas-flame plays over the open part at the bottom and a current of warm air circulates between the walls so that the interior is equally heated. At the top a thermometer is passed through a hole in both walls into the interior and there is also a place for a thermo-regulator. The form of apparatus shown in the sketch may either stand on the floor or be hung up on the wall—a layer of asbestos paper intervening between it and the wall. It is more convenient than the older forms, where there was no door outside, but where the inside box was enclosed in an outer iron cover. Here the door can be opened and apparatus removed or introduced with great ease and without first allowing the box to cool.

All the other apparatus which comes in contact with the cultivating material, such as inoculating needles, pipettes, etc., should also be sterilized by dry heat. Antiseptic lotions, especially 1:1000 corrosive sublimate solution in water, may be used to purify the outside dishes, etc., in some cases, but they must not be employed for anything which will come in contact with the cultivating material, because a very small quantity of the sublimate will prevent growth. Carbolic acid must also be avoided unless it is afterward washed away, as even the presence of the vapor will hinder development.

There are two classes of cultivating materials employed, viz., fluids and solids. The methods by which these are prepared and used differ a great deal, and must therefore be considered separately.

1. FLUID CULTIVATING MEDIA.—A great many fluid media have been employed, of which I need only indicate the chief ones. That most frequently used at the present time is an infusion of meat. This may be prepared by cutting up a pound of lean beef into small pieces and placing it in a vessel containing a litre of water. This is set in an ice safe for twenty-four hours, and then by means of a press all the juice is squeezed out of the meat. Where an ice safe and press are not at hand, it is sufficient to keep the material simmering for two or three hours. In either case, the resulting fluid is boiled well so as to precipitate the albumen. It is then filtered and may be at once introduced into suitable vessels. In this condition the meat is acid, but as an acid medium is not a good soil for many forms of bacteria, it is often neutralized with carbonate of soda. This should be done before it is boiled. The infusion can be made still more serviceable by adding about one per cent. of peptone and a little common salt to it. Some prefer for different purposes the flesh of other animals, such as calf, sheep, chicken, etc., but there is not really much advantage in the one infusion over the other.

Various vegetable infusions are also very serviceable. At one time I used an infusion of cucumber very extensively, and found it an excellent material, more especially for micrococci. It is, however, strongly acid, and must be neutralized when required for many forms of bacilli.



Urine was at one time a very favorite medium, but it has fallen into disuse of late. It may be used unboiled or boiled. Urine, as it exists in the bladder of a healthy person, is free from microorganisms, and the problem is therefore to get it into sterilized vessels without contamination. This may be done in the following manner: The glans penis is first thoroughly washed with 5 per cent. carbolic acid solution, and then with 1 : 500 corrosive sublimate solution. Not only is the glans washed, but the lips of the urethra are everted and also washed. The first few drops passed are rejected, as they may be mixed with the disinfecting solutions. The cotton-wool cap of a sterilized flask being removed, its place is instantly taken by the glans penis, and urine is passed into the flask. The cap, which has been held in such a way that the inner surface could not become infected with dust, is then at once reapplied, and the vessel is placed in an incubator, kept at the temperature of the human body, in order to see if it remains pure. For some reason which has not yet been worked out, unboiled urine is not a very favorable cultivating medium; boiled urine, on the other hand, is much better. Hence, as a rule, when urine is employed it is boiled, filtered, and then sterilized by heat.

Cow's milk is also a very excellent cultivating fluid. As the milk exists in the gland of a healthy cow, it is free from bacteria and with suitable precautions can be obtained pure, but the difficulties are great, and boiled milk is quite as good a cultivating material. Fresh milk should be employed, and must be sterilized by heat.

Blood and blood serum are also sometimes employed. The blood is withdrawn with precautions against contamination. The skin is thoroughly scrubbed with antiseptic lotions (carbolic acid and corrosive sublimate), and is then divided with a disinfected knife—in fact, the various steps of the operation are performed antiseptically; when the vein is exposed (the internal jugular vein is the best) a ligature is placed loosely around it, a small incision is made, and a piece of glass tubing, sterilized by passing it through the flame, is tied in. To the end of the glass a piece of India-rubber tubing, which has been boiled, is attached, and the end of this is passed into a sterilized flask, a mass of pure cotton-wool surrounding it at the neck of the flask. When sufficient blood has been obtained the tube is clamped and withdrawn from the flask, and the proper sterile cotton-wool plug is applied. It is often difficult in such a case to get a supply of serum. Sir Joseph Lister observed that when the flasks were sterilized by heat the clot did not contract even after many weeks, and no serum could be obtained. In order to prevent this occurrence it is necessary to agitate the contents of the flask for some time, in the same manner as one whips blood. Blood or serum obtained in this way is, contrary to expectation, a very bad cultivating medium; very often it is necessary to introduce a large number of the bacteria before growth can be obtained. On the other hand, if the serum or blood is diluted with water, growth occurs readily and luxuriantly.

The simplest way of obtaining serum is to withdraw it from the body without taking all the precautions mentioned before, only taking care not to let in more microorganisms than is unavoidable and then, when the serum has separated, to collect it in sterilized tubes and sterilize it by repeated heating to a temperature short of coagulation (about  $60^{\circ}$  C.) for an hour a day for five or six days in succession.

At one time artificial cultivating materials were a good deal employed, of which the chief were Pasteur's and Cohn's solutions. These have now fallen into disuse because they are by no means favorable cultivating media, only a few species of bacteria growing in them at all readily.

The composition of Pasteur's solution was:

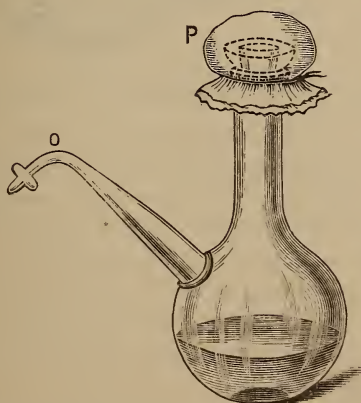
Tartrate of ammonia . . . . .	1 gramme.
Candy sugar . . . . .	10 grammes.
Ashes of yeast . . . . .	1 gramme.
Water . . . . .	100 c. cm.

Cohn introduced the following modification of Mayer's solution:

Phosphate of potash . . . . .	0.5 gramme.
Crystallized sulphate of magnesia . . . . .	0.5 "
Tribasic phosphate of lime . . . . .	0.05 "
Tartrate of ammonia . . . . .	1 "
Distilled water . . . . .	100 c. cm.

In using these fluid cultivations it is often convenient to keep a stock solution at hand. For this purpose the flasks introduced by Sir Joseph Lister are very convenient (Fig. 2). These flasks have two necks, a

FIG. 2.

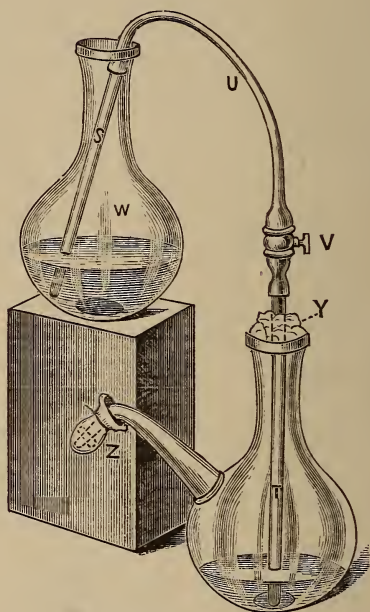


Lister's flask for preserving cultivating materials. O, the narrow neck. P, the cotton-wool cap.

large vertical one and a lateral one, which is a bent spout, large at its commencement and comparatively narrow at its shorter terminal part beyond the bend, O. The large size of the first part of the neck prevents it acting as a siphon, and the result is that when liquid is

poured from such a flask, and the vessel is afterward restored to the erect position, the end of the nozzle remains filled with a drop of the liquid, and this guards the orifice so that regurgitation of air can never take place through the nozzle. Before sterilizing these flasks a cap of cotton-wool is tied over each orifice so as to prevent the entrance of dust. In filling these flasks (Fig. 3) it is best to introduce the fluid into them

FIG. 3.

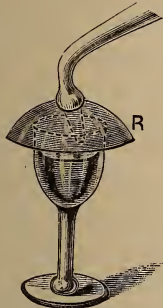


Method of filling a Lister's flask (see description).

by means of a siphon (U), consisting of two glass tubes connected by two pieces of India-rubber tubing with an intervening stop-cock (V). The siphon is first completely filled with water, and then one leg (S) is placed in the vessel containing the filtered cultivating material (W), and the tap is turned so as to run off the water and replace it with this fluid. The stop-cock is then shut, a piece of carbolized rag is wrapped around the lower extremity of the free tube and applied to the mouth of the flask as soon as the cotton cap is removed; the tube (T) is then pushed steadily down to the bottom of the flask (X), through the carbolized rag (Y), the stop-cock turned, and the required amount of fluid introduced. When this has been done the tap is again turned off, the siphon withdrawn through the antiseptic rag, and a fresh cap of sterilized cotton-wool is tied over the mouth of the flask when the carbolized rag is removed. The fluid is then sterilized and can be kept for any length of time. A portion of the fluid can be poured out of the flask

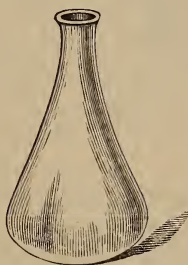
into smaller vessels from time to time without injury to the stock solution. To do this the cotton cap is removed from the nozzle of the flask, and the end of this is instantly slipped through an opening in the centre of half an India-rubber ball which has been previously sterilized (Fig. 4, R). The protecting plug or cap having been removed from the vessel to be filled, the India-rubber cap instantly takes its place, thus preventing all entrance of dust, and the requisite amount of fluid is poured into it. When this is done, the sterile plug is again inserted into the newly filled vessel. The India-rubber ball is then removed from the flask, the drop of fluid

FIG. 4.



Method of filling vessels from a Lister's flask.  
R, half an India-rubber ball through which  
the nozzle is passed.

FIG. 5.



Erlenmeyer's flask.

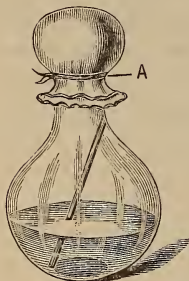
which remains in the nozzle sucked away with a carbolized rag, and a fresh sterilized cotton cap is applied. With a little practice these manipulations can be carried out in such a way that neither the fluid in the stock solution nor that in the newly filled vessel is contaminated; but it is well to make quite sure of this by sterilizing both again. If it is necessary to know exactly the quantity of fluid in the flask or tube, it must be filled by means of a graduated pipette or burette.

For cultivating purposes the vessels generally used are test tubes or flasks, the form known as the Erlenmeyer flask (Fig. 5) being the best. The necks of the tubes and flasks are generally tightly plugged with cotton-wool before they are sterilized in the hot box. The objections which I have to this method are that dust collects on the top of the wool and in pulling out the plugs some particles may fall into the interior. The danger of contamination can generally be avoided by igniting the top of the plug before it is removed, thus destroying any living germs which may be present in it. But particles of dust may have passed down for some distance between the wool and the glass, and may escape destruction. This is not of so much moment where the cultivations are solid, because the vessels may be held very obliquely or even upside down, but where fluids are used it is not so easy to prevent their admission. For this reason, when I use fluids I generally employ flasks and not test tubes, and instead of plugging their necks I tie the wool over



the orifice, and, as after sterilization the wool is more powdery, I enclose the mass of wool in a double piece of gauze (Fig. 6, A). The mass is

Fig. 6.



Flask with cotton-wool cap containing cultivating fluid inoculated by means of a capillary tube.

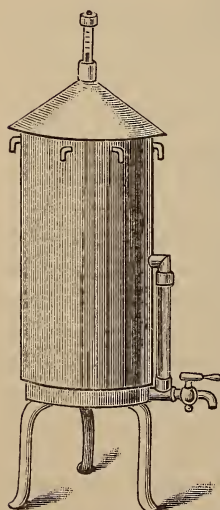
bent over the mouth of the flask and secured round the neck by copper wire. Before opening the flask I wet the edge of the wool all round with carbolic lotion and also moisten its whole surface. Thus, even though the carbolic acid may not have destroyed the spores on the wool, the moisture fixes them so that they do not fly about when the wool is lifted. Another advantage of this arrangement is that the wool need not be completely removed from the orifice of the flask, but one side may be lifted and any instrument slipped into the flask under cover of the cap.

The culture fluids having been thus prepared, filtered, and introduced either into the stock flask, or into the smaller flasks, must be sterilized because,

during filtration and the other manipulations, they have become contaminated from the air and surrounding objects. This sterilization is best effected by means of Koch's steaming apparatus (Fig. 7). This is

a deep iron or tin vessel in the bottom of which water is placed, and just above the water is a tray on which flasks, etc., can stand. The lid fits loosely and both the lid and the vessel itself are surrounded with felt. The water in the interior is boiled till steam issues from the top, and till the thermometer passed through the lid indicates almost  $100^{\circ}$  C. The vessels containing the culture fluid are then introduced and allowed to remain for from half an hour to an hour. The result is that all bacteria not in the spore state are killed. Following Tyndall's experiments the flasks are then set aside in a moderately warm place for twenty-four hours. By that time spores, if present, will probably have sprouted and, therefore, the steaming process is repeated. To make the sterilization quite certain, another twenty-four hours are allowed to elapse and again the flasks are heated. The result of this is that one may reckon with certainty that all bacteria present in the fluid are destroyed. This is a much better way of proceeding than the old plan of boiling the fluid, because in boiling the fluid a large amount of

Fig. 7.



Koch's steaming apparatus for sterilizing culture materials.

evaporation occurs, and its constitution is, therefore, altered, and also if any portions of the original impure fluid have remained at the top of

the flask, or been splashed up during the bubbling, they may not be sufficiently heated and may afterward contaminate the mass. On the other hand, in the steaming apparatus the whole flask is equally heated and sterilized. Indeed, with such fluids as milk this is the only possible way of sterilizing them, because on attempting to boil milk a scum forms on the surface and the milk either boils over or is imperfectly sterilized.

In the case of blood serum, as has already been said, the temperature should not be raised above  $60^{\circ}\text{C}$ ., for coagulation occurs at  $65^{\circ}\text{C}$ . It has been found, however, that an hour's exposure to  $60^{\circ}\text{C}$ . is sufficient to kill almost all adult bacteria, and one may reckon that if this process is repeated for, say, five or six days in succession, the serum will be completely sterilized.

After the process of sterilization is complete the vessels should be placed for three or four days before use in an incubator kept at the temperature of the human body, in order to be certain that the material is thoroughly sterile.

These flasks may be inoculated in various ways, but more care is requisite than in the case of solid cultures, and a number of flasks must be inoculated at the same time in order to guard against error. The same method may be employed as in the case of cultures on solid media, viz., a piece of thin platinum wire is fixed in the end of a glass rod—a thing easily done by heating both in a Bunsen flame and then pushing the wire into the soft glass—and this wire being heated and allowed to cool is dipped in the material to be tested and then introduced into the fluid under cover of the cotton-wool cap. This can be rapidly done, as a mere touch is sufficient to infect the fluid.

In my early experiments with discharges from wounds<sup>1</sup> I employed the following plan with complete success. Small capillary tubes, those used for vaccination for example, are passed through the flame several times to sterilize them. The end is then applied to the wound and at once a small quantity of the discharge runs up into the tube. The edge of the cotton-wool cap being now lifted, the tube is then dropped into the flask and the cap reapplied (see Fig. 6).

Another plan which I employed when inoculating a second flask from the first, was to use a piece of glass tubing bent at right angles and attached by means of a small bit of India-rubber tubing to a small brass syringe, the piston of which had a ring at the end. The cap of the first flask being slightly raised at one side, the tube, previously heated in the flame and allowed to cool, was introduced into the flask, a small quantity sucked up by withdrawing the piston slightly by means of the little finger passed through the loop and then the cap of the second flask being lifted a drop was expelled into it. With a little practice this

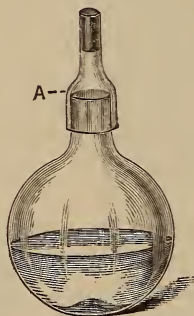
<sup>1</sup> Antiseptic Surgery, p. 230.

manipulation can be performed rapidly and safely. By the same manœuvre small quantities can be withdrawn for microscopical examination as before described.

The above methods are what I have found quite sufficient to enable me to carry on cultivations in fluids with great ease and certainty, but numerous other plans have been described. Pasteur employs a number of peculiar shaped flasks for the preservation of fluids, but as these have no advantage over the Lister flasks, and are more complicated, I need not mention them. The flasks which he uses for cultivations are, however, very simple (Fig. 8). The outside of the necks of these flasks is ground, and over this a glass cap (A), ground inside, fits tightly, and the upper part of this cap, which is narrowed, is plugged with wool, asbestos, etc. The cap is lifted for purposes of inoculation, examination, etc.

Sternberg describes his method as follows:<sup>1</sup> "The culture flasks employed contain from one to four fluid-drachms. They are made from

FIG. 8.



Pasteur's cultivating flasks. A, glass cap.  
(After Hueppe.)

FIG. 9.



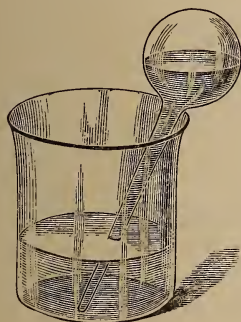
Sternberg's bulb containing culture  
fluid, and ready for use.

glass tubing three- or four-tenths inch diameter, and those which the writer has used in his numerous experiments have all been home-made. It is easier to make new flasks than to clean old ones, and they are thrown away after being once used. Bellows, operated by the foot, and a flame of considerable size—gas is preferable—will be required by one who proposes to construct these little flasks for himself. After a little practice, they are rapidly made; but as a large number are required, the time and labor expended on their preparation is no light matter. After blowing a bulb at the extremity of a long glass tube of the diameter mentioned, this is provided with a slender neck, drawn out in the flame, and the end of this is hermetically sealed (Fig. 9). Thus



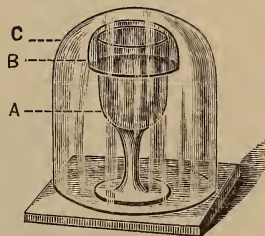
one little flask after another is made from the same piece of tubing, until this becomes too short for further use. To introduce a culture liquid into one of the little flasks, heat the bulb slightly, break off the sealed extremity of the tube, and plunge it beneath the surface of the liquid (Fig. 10). The quantity which enters will, of course, depend upon the heat employed, and the consequent rarefaction of the enclosed air. Ordinarily the bulb is filled to about one-third of its capacity with the culture-liquid, leaving it two-thirds full of air for the use of the microscopic plants which are to be cultivated in it." These fluids are then sterilized by the usual methods, and the flasks are kept in an incubator for several days, to make sure that they are pure. "To inoculate the liquid contained in one of these little flasks with organisms from any source, the end of the tube is first heated to destroy germs attached to the exterior; the extremity is then broken off with sterilized—by heat—forceps; the bulb is very gently warmed, so as to force out a little air, and the open extremity is plunged into the liquid containing the organism to be cultivated. The smallest quantity of this is sufficient, and as soon as the

FIG. 10.



Method of filling Sternberg's bulbs with culture fluid.

FIG. 11.



Apparatus employed by Sir Joseph Lister in his experiments on lactic fermentation. A, liqueur glass. B, small glass cap. C, large glass shade covering the whole.

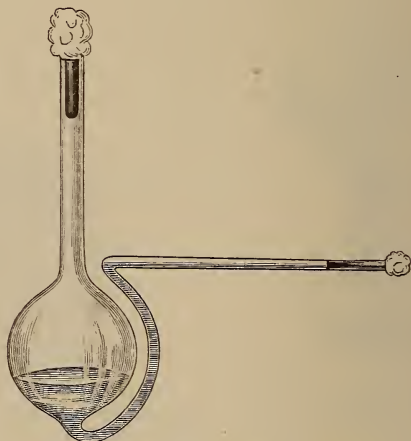
inoculation is effected, the end of the tube is again sealed in the flame of an alcohol lamp. A little experience will enable the operator to inoculate one tube from another; to introduce a minute quantity of blood containing organisms directly from the veins of a living animal; to withdraw a small quantity of fluid from the flask for microscopical examination, etc., without any danger of contamination by atmospheric germs."

Sir Joseph Lister, in his experiments on lactic fermentation, employed a liqueur glass (Fig. 11, A) covered by a glass cap (B), both being covered by a glass shade (C), the glass and the shade standing on a glass plate.

The shade is removed, and the glass cap being lifted for a moment, the contents of the glass can be readily inoculated.

Fluid cultivation materials possess advantages in special cases, though for most purposes they have now given place to solids. One advantage which they have over certain solids is that they can always be placed in an incubator at the temperature of the human body without the result being in any way spoilt, whereas with certain solid media, such as gelatinized media, this cannot be done. In experiments on the growth of bacteria in different gases, fluid media are especially useful, and it is by no means easy with solids to insure that all the air is displaced by the gas to be tested. In my report on micrococci in relation to wounds, abscesses, and septic processes,<sup>1</sup> I described a very simple and efficient plan which I had devised for this purpose. Into the bottom of a glass bulb capable of containing about one ounce of fluid, and having a neck six inches long and about half an inch in diameter, is sealed the end of a long, narrow tube, which is bent up round the side to the top of the bulb, and

FIG. 12.



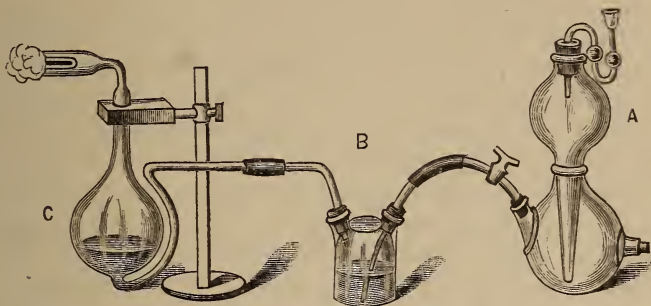
Bulb for testing the influence of various gases on the growth of bacteria.

then runs out for about four inches in a horizontal direction. The end of this tube is well plugged with cotton-wool, a cotton-wool cap is tied round the opening of the neck, and the whole apparatus is sterilized in the hot box (Fig. 12). The purified infusion is then introduced with the usual precautions into the bulb, so as to fill about one-third of it, the cap reapplied, and the infusion sterilized again in the steaming apparatus, if necessary. The bulb is then placed in the incubator for some days to make sure that the fluid is sterile. When the experiment is to be performed the cap is lifted, the fluid inoculated with the bacteria in the

<sup>1</sup> British Medical Journal, September and October 1884.

manner formerly described for flasks, the cap reapplied, and the neck bent to a right angle and drawn out fine, so as to be ready for rapid sealing. The end of the other tube is then connected with the apparatus for generating and washing the gas, and the gas is passed through the

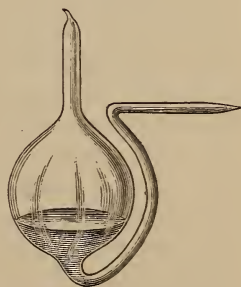
FIG. 13.



To show the method of passing the gas to be tested through the inoculated bulb. A, the gas generator. B, wash bottle. C, bulb containing the inoculated fluid.

fluid until the latter is thoroughly impregnated with it, and the air in the bulb has been entirely displaced (Fig. 13). The time required varies with the rapidity of the flow of the gas, but ten minutes are, as a rule, amply sufficient. The flow of gas is now stopped, and the neck and the small tube sealed in the flame of a spirit lamp (Fig. 14). Thus there is only the gas to be tested in contact with the fluid, and no possibility of entrance of other gases from without. The apparatus can now be placed in an incubator.

FIG. 14.



Bulb with both ends sealed after the gas has been passed through it.

Another purpose, for which fluid media is employed, is for drop cultures. (See under "Microscopical Examination of Unstained Specimens.") Cupped slides are cleansed and passed through the flame, or heated in the hot box, in a beaker plugged with cotton-wool. At the same time, thin cover-glasses are heated by passing them several times through a gas-flame, and are then laid on a glass plate, and allowed to cool under cover from dust. A small drop of the culture fluid is then placed on the centre of the glass, and inoculated with the material to be studied. A little vaseline is put round the margin of the cell, the slide inverted and pressed down on the cover-glass, so that the drop is opposite the centre of the coil, and the slide then rapidly turned upward. These drop cultures are very convenient for observing the movement and growth of bacteria, and for the latter purpose, and for the study of spore formation and sprouting of spores, I have used them extensively. The



sprouting of spores<sup>1</sup> may be readily followed by inoculating a number of these cupped slides with spore-bearing material, and placing them in an incubator. Remove one at stated intervals (say, one hour, one and a half hours, two hours, etc.), lift up the cover-glass, turn it over, and dry the drop of fluid. When dry wipe off the vaseline from the margin of the glass, and stain in a suitable material. In this way, a series of preparations can be obtained, showing all the successive stages in the sprouting of spores. In the same manner, the cycle of growth of an adult organism can also be studied, but, in order to get a series of specimens showing accurately the successive changes, it is necessary to have the same proportion of bacteria to the fluid in each specimen, otherwise a specimen with many bacteria, and but little fluid, may show more advanced changes, especially in the matter of spore-formation, after the same length of time than a specimen with a smaller proportion of bacteria to the fluid. This is easily managed by inoculating a flask of fluid with the bacteria to be studied, placing it for a few hours in an incubator, and shaking it well before taking the drops from it. The bacteria will thus be equally distributed through the fluid, and a fairly accurate series of specimens can be obtained.

As has just been said, fluid cultivations have dropped greatly into disuse of late, on account of very serious disadvantages which they possess, and on account of the many advantages obtained by the employment of solid culture media. The two great disadvantages of fluid media are, that if they become contaminated, the cultivation is spoilt, because the newcomers mix thoroughly with the original bacteria, so that further inoculations from such flasks simply carry over the two kinds. The second disadvantage is, that the original culture must be started from a material containing only one kind of bacterium, for it is extremely difficult with fluid media to separate one form from another. This separation has been attempted in various ways, but these are far too difficult, and require too much time to render them practically useful.

The old plan was, to arrange the composition of the cultivating material, so that it was more suitable for the growth of the desired species than for other species. Then, by fresh inoculations daily, as small a portion as possible of the inoculating material being taken, it was hoped that the desired species would gain the upper hand, and ultimately be obtained pure. This hope was, however, but rarely realized.

The best method was that used by Sir Joseph Lister in his experiments on lactic fermentation, and proposed also independently by Nägeli about the same time. A series of flasks of milk were prepared and sterilized. The milk containing the *Bacterium lactis*, along with other bacteria, was then taken and an attempt made to estimate the number of bacteria in each drop. This was done by placing one-fiftieth of a minim

<sup>1</sup> See paper on *Bacillus Alvei*. Journal of Royal Microscopical Society, August, 1885.

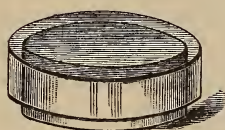
on a cover-glass of such a size that when pressed down on the slide the drop occupied exactly the area of the cover-glass. The number of bacteria in this quantity was next calculated, and then the milk was diluted with boiled water to such an extent that every hundredth of a minim was estimated to contain one bacterium. To each of the glasses containing the pure milk one-one-hundredth of a minim of the diluted fluid was then added and the result was, that in a certain number a pure cultivation of *Bacterium lactis* was obtained.

2. SOLID CULTIVATING MEDIA.—If a boiled potato is sliced and exposed to the air, it will be seen in a few days that the surface of the potato is dotted over with spots of various sizes, some colored, some white, some slimy, some dry, etc. These spots are groups or colonies of various microorganisms, and each has developed from one or a clump of individuals which has fallen on it from the air. In the early stage, while these colonies are yet small, most of them are isolated, so that each of them generally represents a pure cultivation of one or other form of microorganism. If now a small portion of one of these colonies is transferred to a fresh potato by means of a heated knife or needle, and the potato kept in a moist chamber and protected from dust, a pure cultivation of the organism is obtained. Should any stray organisms fall on the surface of the potato during the procedure, they develop and form colonies where they fell, and, therefore, do not necessarily vitiate the whole of the original culture, portions of which can be found which are pure and from which fresh cultures can be made. One very great advantage of cultivations on solid media over cultivations in fluids is thus at once evident, viz., that while the entrance of an accidental impurity entirely vitiates a fluid culture, it does not necessarily spoil one on a solid medium. Potato has been used as a culture medium by several investigators (*e. g.* Schroeter), before Koch's time, and Brefeld and Klebs also employed gelatinized materials, but this was with the view of preventing evaporation, and also of enabling one to turn cultures on glass slides upside down so as to prevent dust falling on them. It was Koch who first recognized the value of solid media in enabling the investigator to get and to keep cultures pure, and in his hands the methods have been elaborated and simplified so that they are now universally adopted. In order to obtain a transparent solid culture medium, Koch employs infusions solidified by the addition of gelatine, agar-agar, etc. These gelatinized materials have turned out to possess other great advantages besides those of enabling one to get and to keep a cultivation pure. It is found that the shape and mode of spread of the colonies vary in different kinds of bacteria which may be microscopically similar, that one spreads only on the surface, another only in the interior of the jelly, one renders the gelatine liquid, another leaves it solid, etc. To such an extent are these peculiarities distinctive that in several instances the diag-

nosis between two organisms is made almost entirely by their behavior in jelly cultivations rather than by their microscopical appearance, and in all cases attention must be paid to their behavior on cultivation in various media, and to their other characteristics as well as to the microscopical appearances, before deciding as to the species of bacterium under observation. I shall now describe the mode of preparation and use of the materials most frequently employed.

*a. Potato.* For potato cultivations ripe potatoes are best, the small new potato not being nearly such a good medium. As the earth on the outside of the potato is full of bacteria and spores, it must be washed off as much as possible and the eyes of the potato cleaned out. The potato is then laid in a 1 to 1000 watery solution of corrosive sublimate for about an hour. Afterward it is washed in water and placed in the steaming apparatus and kept at the temperature of  $100^{\circ}$  C. for a half to three-quarters of an hour. It is then allowed to cool under cover from dust. In the meantime a couple of glass dishes, one larger than the

FIG. 15.



A pair of glass dishes forming a moist chamber and used for potato, plate cultivations, etc.

other so as to form a cover, are washed out with 1:1000 sublimate solution, and a piece of filter paper moistened with the same solution is placed on the bottom of each, so that when the one is inverted over the other there is a moist surface at the upper and lower part of the chamber.<sup>1</sup> This is to keep the air moist so that the surface of the potato does not dry. The potato after being cooked and cooled is cut into two halves in the following manner: A long flat knife is heated in the flame and allowed to cool. The left hand is then dipped into 1:1000 sublimate solution and the potato is taken up with it. With the knife held in the right hand a single sweep is made through the potato, and the cover of the moist chamber being lifted, the two halves are separated and laid down with the cut surfaces uppermost. The cover is then replaced and the potato is ready for inoculation. In some cases, where the potato is to be placed at the body temperature and kept for some time, tall narrow vessels similar to those used by Koch for testing air (Fig. 26), plugged with cotton-wool and sterilized, and large enough to hold half a potato, are employed.

The surface of the potato may be inoculated by the platinum wire before described, or by a thin, flat knife, by means of which the material is rubbed over the surface of the potato. The knife or needle is dipped in the cultivation to be inoculated and drawn rapidly over the surface of the newly prepared potato.

*b. Gelatinized materials.* Solid and transparent cultivating media

<sup>1</sup> Where these glass dishes are not at hand a very excellent substitute is a soup plate with a meat plate inverted over it, each having been washed with the sublimate solution and provided with the moist blotting paper.



can be made by adding from five to ten per cent. of gelatine to any of the fluid media previously mentioned. The material, however, which seems most universally useful is a meat jelly of the following composition :

Meat, finely chopped . . . . .	1 pound.
Water . . . . .	1 litre.

To the meat extract thus obtained add :

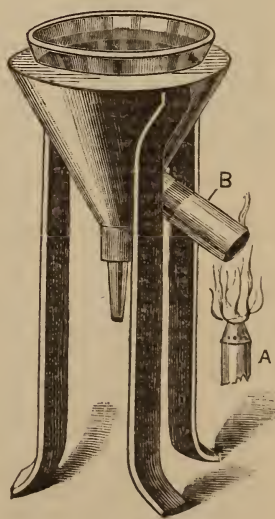
Peptone . . . . .	10 to 30 grammes.
Chloride of sodium . . . . .	5 "
Gelatine . . . . .	100 "

Neutralize or render faintly alkaline with carbonate of soda.

The meat and water are allowed to stand in an ice safe for twenty-four hours. At the end of that time the water is strained off and the fluid contained in the meat is obtained by pressing it in a press, this fluid being added to the rest and the whole made up to one quart. This meat extract is now boiled to precipitate the albumen, then the peptone, common salt, and gelatine are added to and dissolved in it, and the whole carefully neutralized by means of carbonate of soda. The mixture is now filtered through a warm water filter, of which the most convenient form is shown in the accompanying diagram (Fig. 16). It consists of a glass funnel fitted into a copper funnel with a space between them in which water lies.

At the lower part the glass funnel passes through an India-rubber cork which is fixed firmly into the lower opening of the brass funnel, thus rendering the cavity water-tight. In one form a hollow brass arm is attached to one side of the brass funnel and the water in the funnel also passes into this arm. By means of a lamp placed under this arm the water is kept warm. In another form there is no arm, but the filter hangs in a ring which is a hollow tube through which the gas comes, and which has a number of small burners on it. Very often the material must be filtered more than once before it is quite clear. In hot weather, if the filtration occurs slowly, the jelly is apt to be spoilt by decomposition before it is ready. To facilitate matters I have made use of the cook's plan of clearing jellies by means of egg albumen. While the material is cool add to it the whites and shells of two or three eggs, mix well, then place on the fire and boil violently for about fifteen minutes. Care must be taken to remove the

FIG. 16.



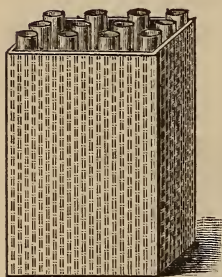
Hot water filter.  
A, Bunsen flame playing on the  
brass arm B.



pot and scum several times during this process, otherwise the material is apt to boil over. Then strain through flannel. The result is that with the heat the egg albumen coagulates and rises to the surface as a scum, carrying with it all the grosser particles, and leaving the fluid fairly clear. When this has been strained it should be made up again to a quart, filtered and tested to see if it has become at all acid, for if so it must be again neutralized. It will now be found to run through much more quickly. In filtering it, the top of the filter should be covered with a plate or saucer to prevent the upper part of the filter paper from drying up, and the filtrate should be received into a purified vessel.

The jelly, when filtered, is again made up to a quart and may be placed in a pure flask, sterilized, and kept as a stock material, but it is usually put at once into the smaller vessels, in most cases into test-tubes. The test-tubes are washed, plugged with cotton-wool, and sterilized in the hot box as previously described. It is very convenient, for the purpose of handling the tubes, to place them in crates of galvanized iron-wire net (Fig. 17) each holding about twenty or thirty tubes. They are sterilized in this. When filled they are again arranged in the crate, and can be conveniently placed in the steaming apparatus, taken out again, etc.

FIG. 17.



Crate containing test-tubes.

The tubes may be filled in various ways; generally about one-fourth of their interior is occupied by the jelly. In many cases it is important to know how much jelly is present in the tube, and for this purpose the tubes are filled with a sterilized graduated pipette. Generally about 10 c.cm. are put into each tube. The operation is performed in a room but little used, where there is not much dust flying about. The tube is taken between the forefinger and the thumb and held obliquely or even upside down, while the cotton-wool plug is extracted. This is caught by the outer part between the little and ring fingers, the tube is then held more or less upright, the pipette with the jelly rapidly introduced, care being taken to avoid wetting the neck of the tube, the pipette emptied and withdrawn, and the cotton-wool plug reinserted. When it is not absolutely necessary to know the exact quantity it is much more convenient to fill them from a Lister flask in the manner before described.

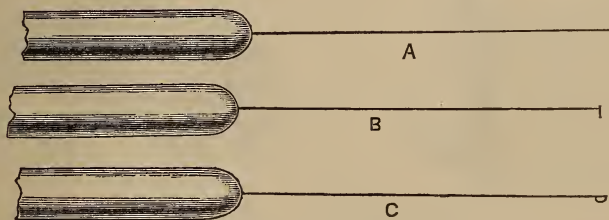
The jelly must now be sterilized, and this is done by means of the steaming apparatus as before described with fluids. The steamer having been raised to 100° C., the crates or flasks are introduced, and left in it for ten minutes or a quarter of an hour, and this is repeated on three successive days. Care must be taken not to heat the jelly long or too often, for heat converts the gelatine into acid gelatine, which does not

solidify. Thus, if the tubes were kept at the temperature of  $100^{\circ}$  C. for an hour or more for three successive days, the jelly would probably not set at all or only do so very imperfectly. The tubes are now set aside for some days at a moderate temperature ( $16^{\circ}$  to  $20^{\circ}$  C.) to see if they have been properly sterilized. If the jelly remains quite clear and free from the development of colonies, it may then be used for experimental purposes. When the jelly has been kept in the tubes for some time it evaporates at the upper part, and then when a wire is introduced to inoculate it, it splits. Hence, old jelly should be liquefied and allowed to set again before use.

There are three chief modes of using the jelly for cultivations; these may be termed test-tube cultivations, plate cultivations, and glass slide cultivations. The temperature at which the material should be kept varies from  $16^{\circ}$  C. to  $23^{\circ}$  C. or  $25^{\circ}$  C. Good 10 per cent. gelatine is just solid at  $25^{\circ}$  C., while very few organisms grow at all well below  $16^{\circ}$  C. The best temperature for growth and for solidity is from  $20^{\circ}$  C. to  $22^{\circ}$  C.

In test-tube cultivations the jelly is allowed to solidify in tubes placed perpendicularly. To inoculate these tubes, the platinum wire fixed in the glass handle is employed (Fig. 18, A). The wire should be quite

FIG. 18.



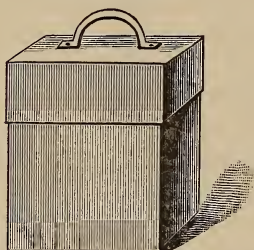
Platinum needles for inoculation. A, straight needle for inoculating tubes. B, bent needle for glass slide cultivations. C, looped needle for plate cultivations. (After Crookshank.)

straight and thin. The cotton-wool plug is set on fire to destroy all the dust on its outer surface. The tube is then held obliquely between the fore and middle finger, the plug withdrawn, and caught by the outer part between the ring and little finger, the wire which, as well as the adjacent piece of glass rod, has been heated and allowed to cool, is dipped in the material to be inoculated and rapidly plunged into the jelly right down to the bottom of the tube. It is then withdrawn, the plug reinserted, and the tube placed upright at a suitable temperature. Where one tube is to be inoculated from another, the new tube is held between the fore and middle fingers well up to the web, and the old tube between the middle and ring fingers near their tips, and the cotton-wool of the new tube is first removed. The idea is that if all the dust in the corks

is not destroyed by the burning, it will not much matter if that from the cork of the new tube falls into the old one; whereas, if the opposite were the case, the new cultivation would be spoilt. The result of this method of inoculation is that growth may occur either along the track of the needle in the interior of the jelly, or on the surface, spreading from the point where the needle entered the jelly, or at both places, and from this and from the characters of the resulting growth, valuable information is often obtained as to the kind of bacterium under observation. In some cases where only a surface growth is wanted, it is most convenient to allow the jelly to solidify obliquely, and then inoculate the surface by drawing the infected needle over it. In keeping up a series of cultivations these test-tube cultivations are always employed.

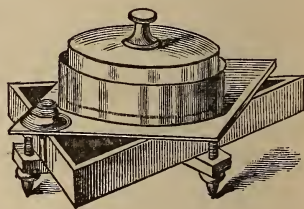
Plate cultivations are of great value for many purposes—*e. g.*, for separating bacteria from one another in a mixture; for studying the characteristics of particular forms; for ascertaining the number present in any material, or whether any are present at all, etc. In this method of cultivation a tube is inoculated with the material to be investigated; the jelly is liquefied at the body temperature; it is then well shaken to

FIG. 19.



Iron box in which the glass plates used for plate cultivations are sterilized and kept.

FIG. 20.



Arrangement for providing a level surface for plate cultivations. The plan described in the text for rapid cooling by means of iced water is not shown in this drawing.

diffuse the bacteria throughout it, and before it sets it is poured out on a sterilized glass plate, which is afterward kept at a proper temperature in a moist chamber, protected from dust. The glass plates are flat pieces of glass, generally oblong in shape, and measuring about six inches by four. They are cleaned and placed in an iron box like that shown in Fig. 19. This box containing the plates is sterilized in the hot box in the usual manner. The dishes used for keeping the plate cultivations are similar to those employed for potatoes, and are prepared in the same manner. Several plates may be placed in the same dish by using a series of glass supports placed one above the other. These are easily made by taking a long narrow piece of glass, and fastening to one side of it at each end a thick glass bar by means of Canada balsam. In



pouring out the liquid jelly on these plates, it is important that they should be level, and also that the jelly should set quickly. For this purpose the following arrangement is employed: A large wooden triangle is supported by three screws, which can be raised or depressed. On this triangle a large piece of glass is placed (Fig. 20). By means of a spirit level and the screws this plate can be made quite level. On this plate a glass dish is set, which is filled quite full with ice and water, and over this another flat piece of glass is placed. The surface of this glass is levelled. On this top piece of glass the glass plate is laid and protected from dust by means of a glass cover. The liquid jelly is poured out on this plate and diffused evenly over it by means of a sterilized glass rod. It sets almost immediately, and can then be placed on a glass tray in the prepared dish, and another plate made, and so on.

The result is that the bacteria being well diffused throughout the jelly, each one that is capable of growing in the material does so, and thus a number of masses or colonies of bacteria appear in a few days throughout the jelly, each of these having presumably started from one individual. Hence, by counting the number of colonies, one may arrive at the number of individual bacteria introduced. Again, experience has shown that different species of bacteria form colonies of different appearances. Some are round, some oval, some smooth, some tuberculated; some have threads shooting out from them into the jelly; some are colored, some not; some cause liquefaction of the gelatine, others do not, and so on. By observing the characteristics of the colonies one may arrive, by means of plate cultivations, at some conclusion as to the species of organism under observation. Again, by means of this method, one can not only enumerate and recognize the bacteria, but can also get pure cultivations from a mixture of different kinds. For if the bacteria and the liquid jelly are thoroughly mixed, and if the jelly solidifies rapidly, each colony will probably start from a single bacterium, and hence each colony will represent a pure cultivation. In separating different kinds, one would not, however, be content with a single plate cultivation; one would make a second set of plates from the colonies on the first. If all the colonies in the second series of plates are similar, one may assume the purity of each, and make test-tube cultivations from them.

The examination of these plates may be carried on with the naked eye, with a pocket lens, or under a low power of the microscope. In the very early stage the colonies are so small that they can only be seen under the microscope, but after a few days they can be seen and recognized by the naked eye or pocket lens. In all examinations microscopic investigation with one-half or one-quarter inch objectives should be combined with the examination by the naked eye or pocket lens. Being an unstained specimen a small diaphragm is, of course, employed.

For any of the purposes for which plate cultivations are employed, it is a disadvantage to have too many colonies on one plate. This may be avoided in various ways. Where the object is simply to get plate cultivations for diagnosis, or for pure cultivations, I generally proceed in this way. Take, say, four tubes of jelly and liquefy them, and, in burning off the tops of the cotton-wool corks, heat also the necks of the tubes. Allow them to cool, and introduce a minute quantity of the material to be tested into tube No. 1. Shake it well, and pour one or two drops from No. 1 tube into No. 2. Shake No. 2 well, and pour a drop or two into No. 3, and so from No. 3 into No. 4. Then make plates from each. In No. 1 plate the colonies will certainly be too numerous, in No. 2 this will also be the case, but in No. 3, and especially in No. 4, only small numbers will be present. The reason for heating the necks of the tubes is to avoid contamination as the jelly is poured from the one tube to the other. Koch's plan is to twist the end of the platinum wire into a small loop (see Fig. 18, C). Dip this loop into the bacteric mixture, and pass it into the jelly in tube No. 1. This is shaken up, and from this tube three loopfuls are carried into tube No. 2 by dipping the loop three times into No. 1, and rinsing it out each time in No. 2. From No. 2, after being shaken up, six loopfuls are transferred to tube No. 3. Plates are then made from each. Where it is necessary to know the number of bacteria in the original material, one must proceed differently. A given quantity, say, fifteen minims, of the original material is added to a given quantity of boiled distilled water, or salt solution (one-half per cent.). This mixture is well shaken up, and then a small quantity (say, two or three minims) is added to each tube of jelly, and from these plate cultivations are then made. In this way, by a simple calculation, the number of bacteria in a given amount of the original material can be ascertained.

Esmarch has introduced a plan of separating bacteria, which is useful in the absence of the apparatus for plate cultivations. Instead of pouring out the contents of the inoculated tube, the latter is turned on its side and rotated, under a stream of cold water, till the jelly solidifies. The whole of the side of the tube is thus lined with a thin layer of jelly in which the individual colonies appear; they can be counted and recognized by means of a pocket lens, or under a low power of the microscope.

Of course, in these processes there is a certain risk of contamination. Contamination from the neck of the tube is avoided by the precaution I suggested before, of heating the neck, and allowing it to cool before pouring out the material. Contamination from the air is avoided by rapidity of movement, and by operating in a still room. The disturbing effects of an accidental contamination are also, to a great extent, neutralized by using the ice, so that the gelatine solidifies quickly, for, if

anything falls from the air, it has not time to sink into the jelly, but remains on the surface, and there forms its colonies, while the other organisms are, for the most part, in the interior of the jelly.

The third method of using nutrient jelly is for glass slide cultivations. For this purpose, either the glass plates before mentioned, or the ordinary microscopic slides are employed. They are sterilized in the usual manner, and are kept, after inoculation, on glass trays in glass vessels, arranged as for plate cultivations. The jelly is liquefied, poured out on the glass slides, and allowed to solidify. When solid, a platinum wire, bent at the end (see Fig. 18, B), and dipped in the material to be tested, is drawn lightly and rapidly over the surface. Generally, a number of slides can be thus prepared without dipping the wire a second time in the mixture. The result of this procedure is that, as the wire passes over the surface of the jelly, it shows the bacteria along its track, and if drawn sufficiently lightly, and rapidly, an organism will only be deposited here and there, especially in the later streaks. There are two advantages of this method. In the first place, it forms one plan of separating bacteria, for many of the colonies are pure cultivations, and are sufficiently distant from one another to enable one to take a pure cultivation from them. And, also, it enables one to test the purity of a cultivation more readily and easily than by means of a plate culture, for, by looking along the needle track under the microscope, one can readily see whether the growth is all of one kind, or whether more than one form is present. The second advantage is, that one can study the mode of spread of certain organisms on the surface of the jelly, and by this means much useful information may be obtained. From these cultures, the beautiful impress preparations previously mentioned are made.

Nutrient jelly is also very useful for cultivating some forms of anaërobes. For this purpose very long tubes are used, which are almost filled with jelly. This is rendered liquid, and then the material containing the supposed anaërobes is introduced and thoroughly shaken up with the jelly. If nothing but anaërobes are present, they will be seen to form colonies deep down in the tube, while a certain thickness of jelly at the upper part remains pure. If both aërobes and anaërobes are present, the former grow at the top and the latter at the bottom. By breaking the lower part of the tube and inoculating fresh tubes in the same manner from the colonies at that part, pure cultivations of the anaërobic organisms will ultimately be obtained.

*c. Agar-agar.* Of all culture materials the nutrient jelly is the most useful, but it has one serious defect, viz., it cannot be placed at the temperature of the human body without melting, when, of course, all the advantages of the solid culture are lost. Other materials which will remain solid at the higher temperature have been tried. Of these the chief is agar-agar, a material derived from certain plants (*gracilaria*



lichenoides). Of this material one to two per cent. is added to a meat infusion mixture, prepared in the same manner as for the gelatine. It is allowed to swell up for twenty-four hours in the ice-safe, and then dissolved in the steaming apparatus. It is extremely difficult material to prepare, and is never quite clear. Hueppe recommends the employment of two layers of filter paper in the funnel, and then a quantity of cotton-wool inside them. It is well in filtering the material to set the whole apparatus in the steaming apparatus, and keep it at  $100^{\circ}$  C. There is no danger of spoiling the solidity of the material by heating it too much. When prepared, it is introduced into and preserved in test-tubes in the same way as the gelatine material. As a rule, the test-tubes are allowed to solidify obliquely. Agar-agar may be used for test-tube, plate, or glass slide cultivations. In using it for plate cultivations great care must be taken not to kill the bacteria introduced, for the agar does not become fluid below  $42^{\circ}$  C. The best way is to have a vessel of water at  $42^{\circ}$  C. at hand. Melt the agar tube in the steamer, and then place it in this water until the temperature of the whole is  $42^{\circ}$  C. Then add the bacteria, shake up, and pour out rapidly on a glass plate.

The temperature of  $37^{\circ}$  C. is maintained by means of an incubator, of which there are various forms. They all essentially consist of double-walled copper or tin vessels with either a lid or a door which is also double-walled. The space between the walls is filled with water. A thermometer passes through a hole in the top into the interior, and a gas regulator passes into the water to regulate the supply of gas to the burner. There are various kinds of gas regulators. The one

Fig. 21.

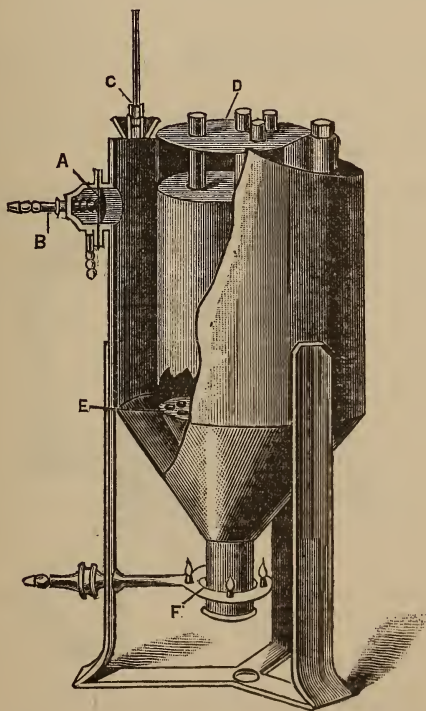


Reichert's gas regulator.

most frequently employed is mercurial, of which Reichert's is the best form (Fig 21). It consists of a long tube, bulbous at the bottom, narrow in the middle, and wide at the top. To the narrow part at the side is attached a wider piece of glass tube, closed with metal, in which a screw works. The upper wider part is ground inside, and has a lateral tube, which is connected by India-rubber tubing with the gas-burner. Into the upper part is inserted a T-shaped piece of glass tubing, ground on the outer side of the upper part of the leg of the T, and tapering toward the end inserted into the long tube. This tubing is open at two ends; at the outer, or larger end, it is connected with the gas supply. At the lower end, the opening is comparatively small, while about the middle of the descending arm, and opposite the large exit from the long tube, is a minute hole. The bulb is filled with mercury, which passes up the narrow tube and fills the lateral tube on the narrow part. The transverse arm of the T-shaped top piece is connected by India-rubber tubing with the gas supply. The action of the apparatus is as follows: At first, gas flows freely into the

T-shaped piece, and thence through both holes into the upper chamber of the long tube, from which it passes on to the gas-burner through the lateral tube. As the water becomes warm, the mercury rises in the narrow tube until ultimately it gets into the upper dilated part, and closes up the lower and larger exit for the gas. Hence gas only passes to the burner through the minute lateral hole, and the flame diminishes. As the water again cools the mercury falls, until at length the lower hole of the tube is freed, and a full flow of gas again takes place. By this alternate rising and falling of the flame, the interior of the chamber is kept at a constant temperature. The regulation for a definite temperature (say  $37^{\circ}\text{C.}$ ) is done in this way: The screw of the lateral tube is unscrewed as far as it will go. When the temperature has reached

FIG. 22.



Outline of d'Arsonval's incubator. A, India-rubber diaphragm. B, gas tube. C, plug and tube at the top. D, lid. E, tray on which cultures are placed. F, gas-burners.

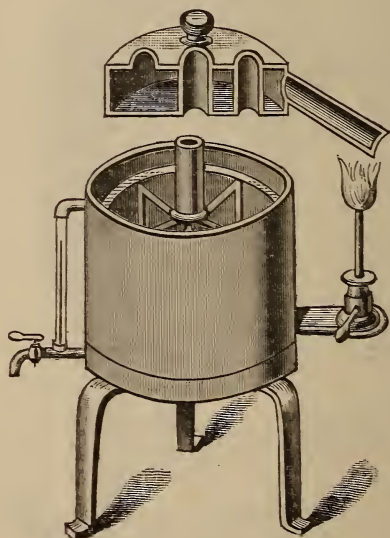
about  $36^{\circ}\text{C.}$  this screw is screwed in, and in doing so displaces the mercury and causes it to rise into the wide top. The lateral screw is screwed in until the lower exit for the gas is shut off, and the flame goes down. Should the small lateral hole still allow too much gas to escape,

it can be diminished by turning round the top piece until the hole is almost closed by the wall of the long tube. The most perfect incubator is the d'Arsonval machine made by Wiessnegg, of Paris, and outlined in Fig. 22. In it, the regulation occurs by the expansion of the water forcing out an India-rubber diaphragm (A) against the gas tube (B). In this case boiled water must be introduced into the machine, in order that the regulation may occur solely by expansion of water and not be complicated by expansion of gas.

Agar jelly has many disadvantages and hence is not, as a rule, much used except to maintain pure cultivations of microorganisms which only grow at the temperature of the body. It is difficult to make, never quite clear, difficult to utilize for plate cultivations, and the different bacteria do not grow with characteristically distinct features to such an extent as on gelatinized materials, and thus its diagnostic properties are less.

*d. Blood serum.* For the cultivation of tubercle bacilli and other organisms Koch has introduced coagulated blood serum. The blood of

FIG. 23.



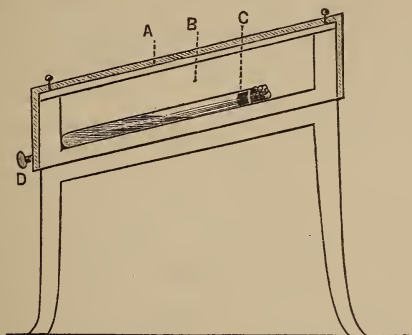
Koch's apparatus for sterilizing blood serum.

sheep, cattle, etc., is received into a long, narrow clean vessel and allowed to stand in the ice safe for twenty-four or thirty-six hours till the serum has separated. The clear serum is then drawn off and introduced into sterilized test-tubes. In his earlier method Koch placed these tubes in an apparatus (a sort of incubator, Fig. 23) regulated for a temperature of  $58^{\circ}$  C. to  $60^{\circ}$  C. They were kept in this for an hour at a time, and



this was repeated every day for six days in succession. At this temperature the serum does not solidify while all the adult bacteria are killed, and on Tyndall's principle the spores sprout in the interval between the heatings, and after two or three heatings all the bacteria are destroyed. At the end of six days the tubes were laid on the bottom of another water bath which could be placed obliquely (Fig. 24), and was provided

FIG. 24.



Koch's apparatus for solidifying blood serum. Lateral view. (After Hueppe.)

with a glass top through which the tubes could be seen. This top was covered with felt when not used. The temperature was then raised to from  $65^{\circ}\text{C.}$  to  $70^{\circ}\text{C.}$ , at which the albumen coagulated, and when the serum was sufficiently firm the tubes were removed and placed in an incubator for two or three days to see if they were sterile. If the temperature is not raised above  $70^{\circ}\text{C.}$ , the serum is fairly clear. (Of late, Koch has been content with simply solidifying the serum slowly at  $65^{\circ}\text{C.}$  at once without the preliminary exposures to  $58^{\circ}\text{C.}$  A certain number of tubes remain pure, but a considerable number are lost in this method.) When the serum has solidified and is allowed to cool, a little condensed steam runs down the sides of the tube and forms a drop of water at the lower part of the oblique surface of the blood serum. In order to be able to look at the growth with the microscope, the serum is sometimes solidified in little glass capsules provided with a glass cover and the bacteria are sown on this by stroking it with the platinum wire.

The blood serum is a very good cultivating medium for certain bacteria, more especially for tubercle bacilli, but it is troublesome to make and by no means the best medium for many other kinds. Hence its use is mainly limited to tubercle and glanders bacilli. After a few days in the incubator the upper part of the oblique surface of the blood serum dries up, and as the tubercle bacilli grow very slowly it is important to avoid this. This may be done by fixing a small India-rubber cap over the mouth of the tube, but this is dangerous because, if spores of fungi have fallen on the cotton-wool, they grow down through the plug, which

is, of course, quite moist under the cap, and fall on to and spoil the cultivation. To prevent this the top of the cotton-wool plug must be burned and washed with sublimate solution (1:1000), and the India-rubber cap must also be washed with the same solution before it is applied.

Various other modifications of these solid media have been used. Löffler, in cultivating the diphtheritic bacillus, added to three parts of the blood serum one part of a neutralized filtered meat infusion, containing 1 per cent. peptone, 1 per cent. grape sugar, and 0.5 per cent. chloride of sodium. The serum was then sterilized and solidified in the manner just described.

*e. Pastes.* For fungi, pastes made of bread, crushed potato, horse dung, various fruits, etc., are very useful. These are made up to a thick paste, introduced into sterilized Erlenmeyer's flasks and sterilized in the usual manner. They are also useful for various bacteria.

Pure cultivations of the various microorganisms may either be obtained from mixtures of various kinds, such as one commonly finds in decomposing materials, etc., or if pathogenic they may be obtained from the affected organism. Most forms can be readily obtained from mixtures by means of gelatine or agar plate cultivations, or, if anaërobes, by means of the long tubes previously described, but in some cases where they grow slowly they either cannot be got at all, or must be obtained from some place where they already exist pure. Take, for example, the tubercle bacillus in sputum. The tubercle bacillus grows extremely slowly outside the body, while sputum contains large numbers of other bacteria which grow very rapidly, hence any attempt to obtain the tubercle bacillus pure by means of glass plate cultivations, or, indeed, in any other way as yet known, must prove a failure. They can, however, be obtained pure by introducing them into a soil in which they will grow and in which the other forms will not. Such a soil is the animal body, but it is quite possible that a similar artificial soil might be prepared, though this has not yet been done for tubercle. I have, however, in the case of certain parasitic skin diseases, more especially in *tinca tonsurans*, obtained pure cultivations of the pathogenic fungus by providing a soil which was unsuitable for the growth of the bacilli and micrococci which swarm on the hairs and yet permitted the growth of the fungus. Such a soil was obtained by adding small quantities of citric acid and extract of nux vomica to the ordinary nutrient jelly. In the case of other slow-growing and spore-bearing organisms, it might be possible to get them pure by adding an antiseptic to the mixture so as to kill the other bacteria, and then, washing the antiseptic away and sowing the material, the spores which would alone survive would grow. Or, it might be done by heating the mixture, as spores resist heat. In such a

case one must suppose that only spores of the particular organisms to be cultivated are present in the mixture.

In the case of pathogenic organisms it is best to get them from the body of the animal affected. If they are present in the blood this is easily done by killing the animal, tying it out on its back on a board, and washing the hair and skin over the thorax thoroughly with sublimate solution (1 : 500). A number of knives, scissors, and forceps are heated in the gas-flame and allowed to cool. With one the skin is divided; this knife is then heated and laid aside. With another the skin is dissected off the thorax. With a pair of scissors the ribs (in rabbits and guinea-pigs) are cut through, and with a fresh knife the sternum is dissected up. Again, with fresh scissors and forceps, the heart is seized and opened, and a pure platinum needle is dipped in the blood. The glass slide cultivations should be used in the first instance, for by this means, if there were more than one kind of organism present in the blood, or if any accidental contamination occurred, this would be at once detected by examining the line of growth, and pure cultivations could be obtained from a pure spot. If, on the other hand, a test-tube were at once inoculated, and an impurity were present, an impure cultivation would be obtained, and might lead to error, as indeed it has often done. Where the bacteria are not present in the blood but in the organs, the body is opened in the same manner; a slice is made into the organ, and a minute piece cut out with pure scissors, and sown on the surface of the gelatine or agar. It sometimes happens that the animal has been dead for some time before it is examined. In that case the outside of the organ may be covered with bacteria, and therefore it must be washed with sublimate solution, and a cut made almost across it with a pure knife. As the knife may have carried in bacteria from the outside, a fresh cut is made at right angles to this with a fresh knife, and to make assurance doubly sure, a third cut is made at right angles to the second, with a third knife. From the deeper part of this third cut small pieces are taken and used for plate cultivations, glass slide cultivations, etc. These are examples of the methods of procedure; they must be modified and adapted to the particular cases in question.

These methods of cultivation are also much used for the purpose of ascertaining the number and kinds of bacteria in water, earth, and air, and the results, though not quite exact, nevertheless give a great deal of useful information. The results are not as yet exact, because in the first instance we do not as yet know all the pathogenic organisms, and therefore bacteria may grow which we do not recognize as pathogenic. In the second place, all the pathogenic organisms may not grow on the soil employed or in the presence of oxygen, and yet these special forms may be present in large numbers in the material tested. And in the third place, they may grow so slowly that the culture material may be com-



pletely invaded by other forms before there has been time for the colonies of the pathogenic organism to become visible. In spite of these disadvantages, however, much information may be obtained as to the sanitary conditions of water and air in particular localities, for the presence of a large number of bacteria in a water indicates contamination and the existence of an amount of pabulum which ought not to be there.

The examination of earth is easily carried out by pounding up some of the earth to a fine dust in a sterilized mortar with a sterilized pestle. A minute quantity is then picked up on the point of a sterilized penknife and scattered over the surface of the nutrient jelly which has been poured out on a glass slide and allowed to solidify (glass slide cultivation). Under the microscope it will be seen that growth starts from the majority of the particles of earth, and if the earth has been pounded up sufficiently fine most of these centres of growth will be pure cultivations. Hueppe recommends that as anaërobes are always present in earth, some of the slides should be covered with a thin strip of mica. He also suggests that a quantitative analysis of earth may be made by mixing a certain weight of the powdered earth with a certain quantity of boiled water, and then testing this in the same manner as water. This method, however, can only yield imperfect results, as the earth quickly subsides, and it is not easy to distribute the bacteria equally through the water, many of them remaining adherent to the particles of earth. Koch has shown that the majority of the bacteria in earth are close to the surface, while deep down only spores and anaërobic forms are present.

In testing water one has to take into account both the numbers and the kinds of bacteria present. The water to be tested must be received into sterilized vessels and corked with a sterilized cork or glass stopper. A definite quantity is mixed with the nutrient jelly, and plate cultivations are made. As a rule, in the case of filtered water eight to sixteen minims may be added to three drachms of jelly without much risk of having too many colonies as a result; but with unfiltered water, or very impure water, much smaller quantities must be used, and indeed in some cases the water must be still further diluted by adding a known quantity to a given amount of boiled distilled water, and then using a certain quantity of the mixture for the cultivation. For ease in counting the colonies, when these are numerous, the glass plate is laid on a piece of black cardboard divided into small squares. By counting the number of colonies present in several of the squares, and by ascertaining the number of squares occupied by the jelly, a fairly accurate estimate of the numbers can be arrived at.

Air may be tested in various ways. By the older plans the air was aspirated over glycerine-covered surfaces, or through gun-cotton which was afterward dissolved in alcohol and ether and in other ways, and the dust so collected was subjected to microscopical investigation. The

results of this plan are practically *nil*, for it is impossible to recognize among the débris what are and what are not living organisms, nor what species are present. Hence, resort is now always had to cultivation experiments. Miquel, who has done most work on this subject, uses for the most part vessels of the shape shown in Fig. 25, containing cultivating fluids.

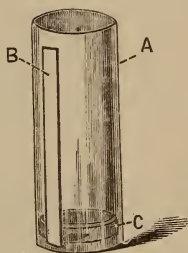
FIG. 25.



Miquel's bulb for testing air by means of cultivation. (After Hueppe.)

A large number of these vessels are prepared and the pointed extremity, A, being broken off, a known quantity of air is drawn through each. The end A is again sealed and the bulbs set aside in a warm place (*e. g.*, an incubator) for development. A certain

FIG. 26.



Koch's apparatus for testing air. A, glass cylinder. B, strip of brass or tin. C, glass capsule for jelly.

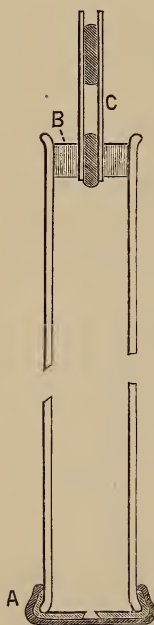
number of bulbs show development, a certain number remain pure. By counting the number in which development occurs and ascertaining the total quantity of air drawn through all the flasks Miquel estimates the number of bacteria in that amount of air. This method is totally untrustworthy and fallacious, for there is no certainty that development in each flask occurred from only one germ, there is no possibility even on microscopical examination of determining whether each is a pure cultivation or not, and one cannot tell what kinds are present.

Hueppe's method is a great improvement on this. He aspirates a definite quantity of air through a certain amount of culture fluid and then, shaking the flask well to distribute the bacteria equally through the fluid, he makes plate cultivations with known quantities of the fluid in nutrient jelly and agar, testing the mixture of air and culture fluid in the same way that water is tested.

Koch employed a glass cylinder six centimetres in diameter and eighteen centimetres high (Fig. 26, A), at the bottom of which is placed a flat glass capsule, C, to hold the jelly; this glass capsule can be easily lifted out of the cylinder by means of a piece of tin bent at right angles, B. The cylinder, capsule, and strip of tin are cleaned, the cylinder plugged with cotton-wool and the whole sterilized in the hot box. When the

vessel has cooled, the cotton plug is removed, the capsule lifted to the margin of the cylinder, half filled with nutrient jelly (for this purpose Koch used a wheat infusion jelly), replaced, and the cylinder immediately replugged with the wool. Any organisms which fall in during these manipulations sink into the jelly and develop in its interior and not on the surface. When the jelly has set, the vessel is taken to the place where the air is to be tested, the plug removed and placed in a sterilized vessel and the cylinder left open for some time (even for some hours). Dust falls on to the jelly and after a sufficient length of time the plug is reinserted and the apparatus set aside for development. Growth occurs at various points on the surface of the jelly. This method gives a rough estimate of the kinds of organisms present in the air, but does not give any accurate account of the numbers present in a given quantity.

FIG. 27.



Tube used in Hesse's method of testing air. A, end covered with the caoutchouc caps. B, caoutchouc cork. C, glass tube.

Hesse has devised an elaborate apparatus for quantitative analysis, of which the following account may be given from his paper:

"The method devised by me, and employed in my investigations, consists essentially in drawing air through long tubes, the walls of which are covered with a layer of solidified nutrient jelly. The current of air is regulated and measured by means of an aspirator. From the number of colonies which develop on the jelly, and from the quantity of air employed, an accurate estimate is obtained of the number of germs in the air. This, however, gives only the number of germs which come in contact with the nutrient jelly, and which can grow under the conditions under which they are placed, such as at the temperature and on the nutrient soil employed."

APPARATUS.—For these experiments one requires glass tubing, nutrient jelly, and an aspirator.

"*Glass tubing.* The most convenient tubes to employ are about 70 cm. long and 3.5 cm. broad, having a capacity of about forty cubic inches. The tubes, the edges of which at each end are somewhat thickened or bent outward, are now prepared for the reception of the jelly; over one end a closely fitting caoutchouc cap is fastened, having a central hole of about one centimetre in diameter, and over this a second entire cap is placed; in this way the tube is completely closed at this end (Fig. 27, A). If one applies only a single cap over the end of the tube, as I did in my early experiments, there is a danger of detaching the jelly from the glass when the cap is removed, and, therefore, I used to cut out a small central hole in the cap before the commencement of the experiment; but by the use of two caps there is no danger of disturbance of the jelly by the removal of the outer cap.

"Into these tubes 50 c. cm. of fluid nutrient jelly are introduced by means of a pipette. This quantity is sufficient to cover the inner wall of the tube completely.

"Into the other end of the tube now containing the jelly a tightly fitting caoutchouc cork (Fig. 27, B) about 2 cm. in diameter is introduced. The



central part of this cork is perforated with a hole about 1 cm. in diameter, and through this passes a piece of glass tubing, C, about 10 cm. long and 1 cm. wide, and containing two plugs of cotton-wool. The plug nearest the large tube projects a little beyond the end of the small glass tube. This small piece of tubing is for the purpose of easily connecting the large tube with the aspirator, of equalizing the atmospheric pressure inside and outside the tube, and of acting as a filter for the air. The use of the two wool plugs is in order to meet requirements to be referred to later, which make it desirable to remove a part of the contents or to alter the position.

"The tubes, etc., are by no means free from micro-organisms even though the greatest care and cleanliness be observed. Although these accidental impurities could be recognized from the position in which the colonies appear (mostly in the substance of the gelatine), nevertheless, in consequence of their further development the result of the experiment would not be satisfactory; and further, the innermost wool plug, which, as will be later seen, is employed to control the accuracy of the experiment, would, on account of its contamination, be useless for that purpose; hence, it is necessary to destroy these organisms. This is most conveniently done by exposing the tube with the gelatine, etc., for one or two hours to a current of steam at or near 100° C. For this purpose I employ an apparatus similar to that described by Koch, Gaffky, and Löffler (*Mittheilungen aus d. Gesundheitsamtes*, p. 332). By means of it six tubes can be sterilized at one time. It consists of a cylindrical tin vessel about 1 metre high and 13 cm. wide, covered with a tin cap and surrounded by felt; this cylinder is fixed on the top of a tin vessel 20 cm. high and 13.5 cm. wide, filled with water.

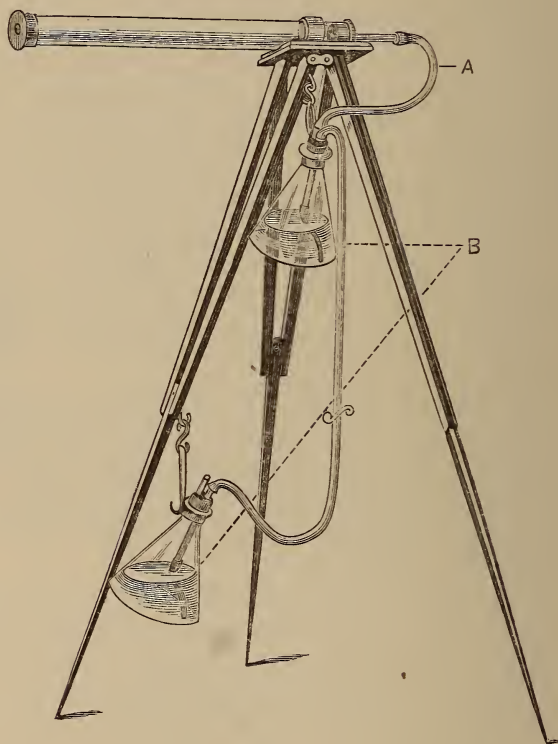
"After the tube has been removed from the steaming apparatus, and while the jelly is still fluid, it is moved in various directions under a cold water tap till the jelly solidifies. Thus an even coating over the whole tube is obtained, but in later experiments it was not found necessary to have the whole wall of the tube covered, as the organisms fell on the side on which the tube lay. The tube is now washed externally in a 1 per cent. corrosive sublimate solution, and fixed horizontally on a stand." (This stand is somewhat similar to that used in photography. See Fig. 28.)

By means of an elastic tube (A) attached to the narrow glass tubing the aspirator (B) is now connected with this tube. (Hesse generally uses two 10 litre flasks.) The one nearest the apparatus is filled with water, the other is empty. By setting a siphon arrangement into action the water flows from the upper into the lower flask, and the air which takes its place must pass through the apparatus. The rapidity of flow is easily regulated by a stopcock. When everything is ready, the outer caoutchouc cap over the end of the large tube is removed, and the water is made to flow from the upper to the lower flask at a moderate rate. It was found experimentally that all the dust was deposited in the large tube, unless the flow was very rapid. After a sufficient quantity of air has been drawn through, the aspirator is detached, the outer cap re-applied, and the tube laid horizontally at a suitable temperature (20° to 25° C.). In two or three days colonies are evident, and may then be counted and investigated.

None of these methods are quite satisfactory, and a good deal remains to be done in the way of improving this line of research. Probably by using both Hesse's and Hueppe's plans useful results would be obtained.

A very important application of these culture methods is to test the value of antiseptics. The older plans for testing antiseptics were either to add a certain quantity of the antiseptic to cultivating fluids and then inoculate with some putrid material, to see if growth occurred, or to add

FIG. 28.



Hesse's apparatus for testing air fixed on its stand and ready for use.  
A, elastic tube connecting the glass tubing with the aspirator. B, the aspirator.

the antiseptic substance in a certain quantity to the mixture of bacteria, and then from this to inoculate a cultivating fluid. There are several objections to this plan. For example, as the special forms of bacteria tested were not known there was no certainty that the resulting growth was not accidental. Again, no account was taken of whether the bacteria acted on were in the spore or the adult condition.

Koch improved this method very much by using only known and well-characterized bacteria in his experiments, by ascertaining whether spores were present or not, and by employing solid culture media, and thus shutting out the confusion which might arise on account of accidental contamination. He also increased the certainty of his results by employing pathogenic bacteria, such as the anthrax bacillus, and after-

ward testing the result by inoculation of suitable animals. In the first place, he prepared a number of small pieces of cotton threads by putting them into a tube plugged with cotton-wool and sterilizing them. He then made a copious cultivation of the organisms or spores to be tested, soaked a number of the threads in the cultivation, laid them in a sterilized watch-glass, and placed them in a drying chamber over sulphuric acid. In the dry state non-spore-bearing bacteria may live three or four days; spores live a long time. He used cultivations of a large number of well-known organisms, such as *Micrococcus prodigiosus* for non-spore-bearing bacteria, and anthrax spores for spore-bearing organisms. The threads, when dry, were steeped for various lengths of time in solutions of the antiseptic of different strengths, then taken out and washed in boiled distilled water, or in alcohol and ether, and laid on potato, or on jelly poured out on glass slides. In a few days it was evident whether growth had occurred or not, and it was easy to determine if the growth resulted from an accidental contamination, or from the organisms tested. For, if the latter, the growth would start from the threads, and would also show the characteristics of the organism in question, such as the color of *Micrococcus prodigiosus* on potato, or the peculiar network growth of *Bacillus anthracis* on jelly.

In testing the effect of acids on the cholera bacillus,<sup>1</sup> I adopted a different plan, which, I think, has advantages over the other, in some cases. A cultivation of the organism in question in fluids is prepared, and a certain quantity of this cultivation is added to a certain quantity of a solution of known strength of the antiseptic to be tested, well mixed, and allowed to stand for a definite time. Tubes containing liquefied jelly are then taken, and a drop of the mixture of bacteria and antiseptic is added; they are then shaken up, and plate cultivations prepared. Control experiments are, of course, made to make sure that the amount of antiseptic thus added to the jelly is not sufficient to prevent growth. The jelly is already liquefied before the drop of the mixture is added to it, in order that the antiseptic may be at once diffused through the liquid, and not continue to act on the bacteria for a longer time than was intended.

### III. THE STUDY OF BACTERIA IN RELATION TO THE LIVING BODY.

In the case of all pathogenic organisms it is necessary for complete proof that they are the cause of a particular disease to show that, on their introduction into an animal of a species susceptible to the disease, they set up the disease in question. Experiments on animals are also required in the case of bacteria, in order to study the mode of infection and many other points in the natural history of the disease. The method

<sup>1</sup> See Report on the Cholera Bacillus, British Medical Journal, May, 1885.



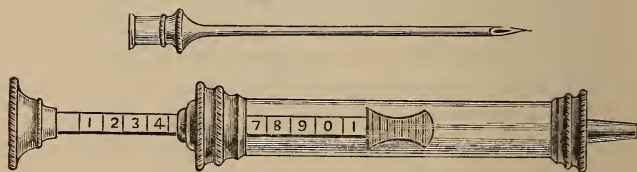
of infection varies in different diseases, but the following are the chief modes employed:

A. CUTANEOUS INOCULATION.—Here a wound is made in the skin, but does not pass into the subcutaneous tissue. A portion of the body is selected which the animal cannot lick, and for this purpose the ear is generally chosen. The hair is shaved off, and the skin washed with sublimate solution (1 : 500), which is again removed with boiled water. The skin is then scratched with a sharp lancet, as in vaccination, and the infective material rubbed into the scratch. This mode of infection acts well with certain organisms, such as anthrax, mouse septicæmia, chicken cholera, etc.

B. SUBCUTANEOUS INOCULATION.—Other organisms, such as the bacillus of malignant œdema, the tubercle bacillus, etc., must be introduced into a pocket in the subcutaneous tissue. The most convenient places for this pocket are, in guinea-pigs on the front or side of the abdomen, in rabbits at the base of the ear, in mice at the root of the tail. The skin is shaved and disinfected in the manner before described, and a small incision is then made through it with a pair of sharp scissors. With some blunt instrument a pouch is then formed in the subcutaneous tissue, and into this the material to be tested is introduced by means of a platinum wire, point of a knife, etc. After it is introduced the skin is rubbed over the place so as to diffuse the material, and, if necessary, the wound may be dressed with a bit of salicylic wool and collodion.

C. SUBCUTANEOUS INJECTION.—The back or the front of the abdomen, and the root of the ear or of the tail, are the situations most fre-

FIG. 29.

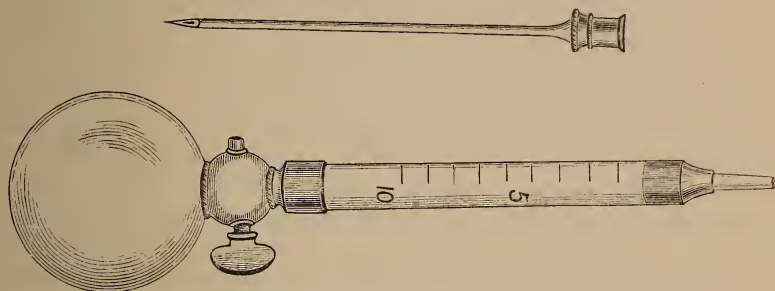


Koch's syringe for experiments on animals—old pattern.

quently selected. The skin is shaved and disinfected as before. The material is drawn up into a syringe of special construction, and the desired quantity is injected. The older form of syringe introduced by Koch (Fig. 29) consisted of a glass tube, on each end of which the thread of a screw is cut, and the metal fittings are thus screwed directly on to the glass. The piston is graduated, and the bulbous metal end is hollowed in the middle, and does not fill up the calibre of the tube; a sufficient amount of cotton or asbestos thread is wrapped around this end of the piston to make it fit the tube accurately. The washers are

made of thin pieces of cork. After each injection the cotton thread and the washers are removed and the syringe is washed. Before use, fresh thread and washers are arranged, and the whole is purified in the hot box. Of late, Koch has introduced a much simpler and more efficient form of syringe (Fig. 30). It consists of a straight piece of glass tubing

FIG. 30.



Koch's syringe for experiments on animals—new pattern.

graduated in tenths of a cubic centimetre, the outer side of each end being ground. Over each end metal fittings are attached; one taking the needle of the syringe, and the other having affixed to it an India-rubber ball with a hole at the top and a stopcock between it and the syringe. The tube and the lower metal attachment can be sterilized in the hot box or by heating them directly in the flame; the upper part does not require to be sterilized, as it does not come in contact with the injection fluid. By pressing the ball with the thumb over the hole, the contents of the tube are expelled, and the tube is filled by emptying the ball by pressure, and then allowing it to fill gradually by relaxing the ball, the end of the needle being dipped in the fluid. When sufficient material has been drawn up, the stopcock is turned. By means of these syringes, injections may be made not only into the subcutaneous tissue, but also into the cavities of the body (abdomen or pleura).

D. INTRAVENOUS INJECTIONS MAY BE MADE INTO THE JUGULAR VEIN OR INTO ONE OF THE AURAL VEINS.—If the injection is to be made into the jugular vein, the animal must be chloroformed and tied out on its back. The skin being shaved and disinfected, and the knives, forceps, etc., also disinfected, an incision is made over the jugular vein on one side, a double ligature passed round it, and between the two ligatures a small V-shaped incision is made into the vein, into which the nozzle of the canula is introduced and tied; the vein is also tied above. Injection may be made by a syringe through the canula, but I have always found it best when large quantities were introduced to use a burette, and let the fluid pass in slowly and without any force.

It is much simpler to inject into the aural vein. A vein is selected at the outer side of the edge of the ear, where the skin does not move over the vein, nor the vein over the cartilage. The skin is shaved and then disinfected, and then the needle of one of Koch's syringes is pushed directly into the vein and the material injected. It is easy to see if the needle is in the vein, and whether the injection flows properly or not.

E. The eye may be very conveniently used for inoculation, as it allows one to observe what takes place afterward. In some cases the cornea only is inoculated by pricking it with an infected needle and the spread of the organisms along the spaces in the cornea can be observed.

The most frequent mode of using the eye is, however, to introduce the infective material into the anterior chamber of the eye. This is more especially useful in the case of bacteria which grow slowly and do not set up much inflammation, such as the tubercle bacillus. In fact, in regard to tubercle, this method has been most valuable in clearing up many points, more especially in disproving the assertions as to the origin of tuberculosis as a result of the introduction of non-tuberculous material into rodents. When non-tuberculous material such as pieces of glass, cork, etc., were introduced into the abdominal cavity and the animal died afterward of tuberculosis, it might have been that the material set up the tuberculous process, or on the other hand that the occurrence of tuberculosis was independent of the operation. When tuberculous material is introduced into the anterior chamber of the eye of a rabbit, it remains there for some days without apparently causing any disturbance—in fact, gradually dwindling away, till in about twenty-one days an eruption of tubercle is noticed on the iris, and thence the disease spreads, affecting the whole eye and in most instances spreading to the body and setting up general tuberculosis. This iris tuberculosis always occurs. If a piece of cork or other non-tuberculous material is introduced into the anterior chamber of the eye, it is not followed by an iris tuberculosis, and should the animal afterward die of general tuberculosis (which occurs extremely rarely), it is thus known that the disease was accidental and independent of the operation. In introducing the material the eye is fixed and a small incision is made at the upper part of the cornea into the anterior chamber, care being taken as the knife is withdrawn that the iris does not prolapse. The material is then pushed into the anterior chamber through this opening by means of a blunt needle. Fluids may also be injected into the anterior chamber by Koch's syringe, the needle being pushed obliquely through the upper part of the cornea.

F. INHALATION.—In some cases it is necessary to test the effect of inhalation of virulent material in producing disease. In doing so the experimenter must, as a rule, guard against the danger to himself. The infective material may be furnished for inhalation either in the form of spray or as dust. In the case of spray the animals are placed in a box



into which the nozzle of a hand spray-producer projects. The retort of the spray contains the infective mixture, and the operator is separated from the spray by a long India-rubber tube. If necessary, he may shield himself by means of a respirator; but, as a rule, the box can be placed in the open air and at such a distance away that he is in no danger.

Spore-bearing organisms may be used in the form of dust, which may be either blown into the vessel containing the animal or placed on the floor of the vessel, which is then shaken to raise the dust.

G. INFECTION BY THE FOOD.—This mode of experimentation is used to test the possibility of infection from the intestine, and in carrying it out there are two points to be attended to: care must be taken, first, that infection does not occur from the mouth or throat; and, secondly, that the infective material is not destroyed in the stomach. At first the experiments were made by simply mixing the infective material with the food, but in these cases infection often occurred from the mouth and throat. To avoid this, Koch adopted the plan of taking two small slices of boiled potato, scooping out a small depression in each piece, filling this depression with the bacteria, placing the two slices in apposition so that the bacteria were enclosed in the potato, and pushing the piece of potato to the back of the tongue so that it was swallowed at once without being chewed.

As regards the second danger, it is only present in the case of non-spore-bearing bacteria. Spores are able to resist the action of the gastric juice, whereas adult forms are, as a rule, destroyed by it. In the case of the cholera bacillus, Koch has devised a plan in the case of guinea-pigs by which the bacilli escape the action of the gastric juice. He first neutralizes the contents of the stomach by introducing into it eighty minims of a five per cent. solution of carbonate of soda. Ten minutes later a culture of the cholera bacillus is injected through a stomach tube (catheter). Lest the bacteria, which thus escape the action of the gastric juice and enter the intestine alive, should pass too rapidly through the small intestine, he then injects a solution of opium into the abdominal cavity (sixteen minims of the tincture for every six ounces of the weight of the animal). Koch hopes that this plan will prove useful in testing other forms of bacteria.

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## THE ETIOLOGY AND MECHANISM OF ASTHMA.

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No subject in medicine has given rise to greater discussion or criticism than that included in the term "Asthma." It was indiscriminately applied by the older writers to dyspnoea arising from various causes, and

at the present time, although the majority confine the term to paroxysmal dyspnœa, accompanied by characteristic physical signs, still we find it used in a loose way to describe dyspnœa due to entirely different pathological conditions.

In this article I wish to confine the term to the paroxysmal dyspnœa which is always characterized by positive physical signs. I will exclude from consideration all other forms. Cardiac asthma due to a weakening of the heart, is not asthma; nor can we include the smothering of pure emphysema, although emphysema may be complicated with asthma. Suffocative attacks of bronchitis belong to the latter disease, although asthma may be also engrafted upon it and immeasurably increase the distress of the sufferer. In various diseases of the nervous system there is marked and paroxysmal dyspnœa, but the physical signs of asthma are always absent.

The older writers divided asthma into idiopathic or essential, and reflex. In the class of idiopathic asthmas were included all for which no reflex origin could be discovered; whilst in those classed as reflex, the point of irritation was mainly found in the bronchi and the mucous membrane of the gastro-enteric canal, the uterus, or the uterine appendages. The number of reflex cases was limited, and the large majority of cases were classified as idiopathic.

Modern investigations have proven that asthma of reflex origin is the most common, and at the present day it seems not improbable that those cases for which no local point of irritation can be discovered, and which seem idiopathic in character, will, by later investigators, be brought into the reflex class. Emotional asthma seems to be most certainly of the essential character; but when we consider it as analogous to vasomotor disturbances of the skin seen in emotional states, causing blushing or pallor, we may find a reflex origin through some of the senses.

Volatalini first drew attention to asthma dependent on the presence of nasal polypi, and showed that the removal of the polypi was followed by a cessation of the asthma. Later investigations have proven that it is not the polypi alone, but rather the peculiar condition of the nasal chamber in which the polypi are found that is the immediate cause of the asthmatic attack. Hack and John Mackenzie, of Baltimore, have especially drawn attention to the fact that a condition of congestion is at times present, and that the cavernous tissues of the turbinated bones become hyperæsthetic. They have endeavored to prove that the special sensitive areas are found either at the anterior or posterior extremities of the turbinated bones. It has now, however, been proven that the whole surface of the membrane is involved more or less in this sensitive area. In this sensitive condition, the presence of an irritant is capable of producing the asthmatic paroxysm. A polypus touching the sensitive area, retained secretions, dust, intense light, or anything capable

of producing an impression on the nasal mucous membrane will provoke the attack. Even a swollen condition of the mucous membrane allowing a lateral pressure between the septum and the cavernous bodies, seems to be a provoking cause. That a nasal polypus alone is not capable of producing asthma, is shown by a case in which I removed a polypus from the lower turbinated bone with complete cessation of the asthmatic symptoms, although the upper portion of the chamber was still filled with nasal polypi. The asthma subsequently returned on a recurrence of the lower polypus.

In the pharynx we find an immediate cause in the presence of hyperæsthetic, enlarged follicles. In a case of this character the asthma was modified by an application to the group of follicles, and disappeared after the destruction of the same.

In 1882 I presented to the American Laryngological Society a paper termed "Laryngeal Asthma." In this article I sought to prove the connection between a hyperæmic or inflamed condition of the larynx and the asthmatic paroxysm. I cited several cases where the asthmatic paroxysm had been modified or entirely removed by the application of an anæsthetic or astringent solution to the larynx. The sensitive area is especially the inter-arytenoidal space and the membrane over the arytenoid cartilages. Since then I have seen a large number of these cases, and will cite the following as illustrative:

Through a misplacement of bottles, I pencilled the larynx of a man suffering with a severe asthmatic paroxysm, with a fifty per cent. solution of carbolic acid. The application caused intense burning, and the patient was able to swallow with great difficulty for several days. The asthmatic paroxysm, however, *was instantly broken on the application of the brush*, and since then he has been entirely free from asthma. I could report many cases in which the spasm has been instantly modified or entirely broken by the application to the larynx of a mild solution of carbolized iodine, or the insufflation of morphia powder. From the success of this form of treatment, the immediate and at times almost instantaneous relief given, I feel justified in saying that the sensitive area of the larynx, in a large number of cases, is the site of localized irritation provoking the asthmatic attack. From a study of a large number of asthmatics, I am fully convinced that the local site of irritation in the greater number lies in the upper air-passages. Störck, Nothnagel, Longet, and Schiff, have demonstrated that the sensitive cough area is located in the inter-arytenoidal space, the posterior surface of the trachea, and at the bifurcation of the bronchi. Later investigators (Hack, Haring, John Mackenzie, Daly, and Roe) have added to these the surface of the lower and middle turbinated bones.

Many cases of so-called bronchial asthma have their site of irritation in the nares, in the larynx, and probably in the posterior surface of the



trachea, and the bifurcation of the bronchi. Cases of asthma caused by odors, the effluvia of animals, and the smell of flowers, or light, are due probably to a pathological condition of the nares. I am also inclined to believe that asthma due to emotional or psychical influence may in certain cases be due to the same cause. It is fully recognized that the so-called vasomotor catarrh, with turgescence and hyperæmia of the cavernous bodies, may be produced by mental impressions, the rose experiments of Dr. John Mackenzie being a striking example. It is also a well-known fact to laryngologists that a transient flushing or blushing of the mucous membrane takes place when the light of the reflector is thrown upon it. The following case is interesting as showing the dependence of a changed condition of the cavernous bodies on a psychical influence. In a patient of the St. Louis Post-Graduate Polyclinic the cavernous tissue of the nose was greatly swollen. I proposed to excise a portion of it. She demurred strongly, and when I insisted, became very much frightened: on looking again, I was astonished to find that the swollen tissue had become much paler, and had been reduced in size fully one-half. This was fully observed by members of the class.

Uterine asthma and peptic asthma, on which so much stress has been laid by Hyde Salter, may also have a possible connection with a certain condition of the upper air-passages. The coincidence of paroxysms of nervous dyspnœa with certain conditions of the uterus and its appendages, is well authenticated; but whether these paroxysms are real attacks of asthma or spells of nervous dyspnœa, in which we find rapid breathing with great intensity of the respiratory sounds, but no asthmatic râles, has not been so conclusively established.

Hyde Salter relates one case, reported by another physician, in which real asthmatic attacks occurred during pregnancy; and Engelmann, of St. Louis, has noted a case in which asthmatic attacks followed a retroflexed position of the uterus, and disappeared with the reposition of the organ; but in this case there is no record of the presence of asthmatic râles. Paroxysmal nervous dyspnœa is quite a frequent accompaniment of a disturbed condition of the nervous system. It is seen in hysteria, neurasthenia, and spinal irritation; it is seen in connection with disorders of the uterus or its appendages, and also in cases of impoverishment of the blood or blood-poisoning. Resembling true asthma in its paroxysmal attacks, it is, however, a distinctly different disorder. The dyspnœa is rather a rapid panting than the labored breathing of asthma; the respiratory sounds are simply intensified normal sounds, and the asthmatic râles are absent.

That asthma occurs at many of the critical periods of female life is certainly true. In regard to pregnancy, I have seen two cases in which the asthma disappeared with conception, and has not since returned.

Both of these patients were asthmatics of long standing. It is in these cases of uterine asthma that we can find often a possible nasal origin for the attacks. The connection between the condition of the cavernous bodies and uterine changes is very marked. Many women at the menstrual epoch have vasomotor catarrh, with great turgescence of the cavernous bodies and the mucous membrane. This condition in itself has been shown to be a sufficient cause for the attack, irrespective of the pathological condition of the uterus. The peptic asthma, on which so much stress is laid by Hyde Salter, may be fully explained by referring the irritation to the larynx. Gastric pharyngitis and gastric laryngitis are recognized forms of throat disease. They are dependent upon functional gastric disturbance, with the production of fermentation and acid secretions. In the peptic asthma quoted by Hyde Salter, the paroxysms occurred during the end of the digestive process, showing that the mere presence of food is not sufficient to cause the attack. The majority of asthmatics are dyspeptics, and it is possible that these cases were subject to a gastric laryngitis, in which the sensitive area of the larynx was involved. A similar condition is found to exist in so-called stomach cough. Although the local seat of irritation seems to be, in the majority of cases, in the upper air-passages, it is probable that a disordered condition of other organs exerts a positive influence in provoking the attack. As this is true in other nerve disorders, as migraine, epilepsy, and neuralgia, it is equally probable in asthma. For example, in a person with a disposition to asthma, the attacks may only attain the degree of the first stage, and give rise to scarcely noticeable symptoms. When, however, an increased irritation is added, as would occur through a disorder of the gastro-enteric canal or uterine disease, this added element would be sufficient to increase the irritation, and the first stage would grow into the second with the appearance of all the well-known asthmatic symptoms. A similar condition is found in neurotic palpitations occurring in a heart weakened by anæmia, where a torpid liver would provoke a disturbance, which, in a normal condition of the secretions, would be absent.

All writers on asthma have noticed the great difference in the severity of the paroxysms not only in different individuals, but even in the same individual at different times. Walsh has even assumed two forms of the disorder, one seemingly dependent on a spasmodic and the other on a paralytic condition of the bronchial muscles. If the asthmatic be closely studied during the paroxysm, we shall find a positive and characteristic connection existing between the severity of the attack and certain physical signs in the lungs. We can clearly divide the paroxysms into three stages, each stage characterized by positive physical signs, and with each stage a certain increasing degree of the severity of the symptom is noted.

The first stage may be called the state of

#### INSPIRATORY DYSPNŒA.

On examination we find the percussion sound unaltered; on auscultation the *inspiratory sound of the vesicular murmur is replaced by a high-pitched, prolonged blowing sound*. The expiratory sound may be absent or unchanged. This blowing inspiration is evidently a *blowing râle*, and it is caused by a cylindrical narrowing of the lumen of the bronchi, not sufficient to cause the sibilant or whistling râles. It is pathognomonic of the first stage of uncomplicated asthma, and differs from the rough inspiratory murmur of bronchitis or the intensified inspiration of the exaggerated respiration such as is heard in compensatory breathing or in the nervous dyspnœa of hysteria or blood poisoning.

When asthma is complicated with bronchitis, this inspiratory blowing sound loses, in a measure, its distinctive quality and becomes rougher and of lower pitch. When emphysema is present, the blowing quality of the sound is less marked, and it becomes much weakened and in some cases is absent.

The symptoms of the first stage are often slight; at times wanting. In some a slight tightness of the chest is experienced; in others a slight dyspnœa is felt on exertion; a paroxysmal cough most marked in the early morning hours is sometimes the only symptom.

The second stage may be called the stage of

#### EXPIRATORY DYSPNŒA.

It presents the physical signs usually recognized as characteristic of the asthmatic paroxysm. Percussion gives an increased resonance. On auscultation, a prolonged expiration is heard. Both expiration and inspiration may be covered by the sibilant and sonorous râles. In certain cases small moist râles of a liquid character are heard over limited portions of the chest. The symptoms of the second stage are those usually associated with the asthmatic paroxysms; the sense of oppression, the dyspnœa, and the slow, labored breathing are marked. The thorax heaves with each inspiration and the accessory muscles of respiration are brought into action, the patient is unable to lie down, but sits or moves in a fixed position, with raised shoulders and head projected forward. The face is livid and the *alæ nasi* dilated.

The third stage may be called the

#### STAGE OF ORTHOPNŒA.

Percussion gives a deep, drum-like resonance, showing the extreme distention of the vesicles. *On auscultation a short inspiratory whiff is heard, and the expiratory sound is inaudible*. The inspiratory whiff is most apparent over the larger bronchi. The symptoms of the third



stage of asthma present a picture of the most supreme distress and agony. The patient stands with the hands resting on some fixed point of support, and the entire energy of the body is given up to the struggle for air. The true respiratory muscles seem to be completely inactive, and breathing is carried on entirely by the accessory muscles of respiration. The thorax is fully distended with little perceptible movement; the face becomes dusky, covered with perspiration—in strong contrast with the cold extremities; a sense of constriction is experienced around the body over the diaphragm.

These three stages are evidently produced by the varying and gradually lessening calibre of the bronchial tubes. In the first stage the calibre of the tubes is not sufficiently narrowed to produce the whistling râles. The inspiratory blowing râle heard in this stage is due to the moderate narrowing of the bronchi. A normal inspiration is the result of atmospheric pressure; the thorax is enlarged by the action of the thoracic muscles and the diaphragm, and the lungs are distended by the atmospheric pressure. The expiration is mainly performed by the lung vesicles. In the first stage the calibre of the bronchi is narrowed, but the walls of the vesicles remain intact and are normal: hence the expiratory sound is normal, but the inspiration assumes the peculiar high-pitched blowing found in this stage. In the second stage portions of the bronchi are narrowed to such a degree that the respiratory sounds assume the form of râles—the sonorous and whistling. The vesicles are distended through imperfect ventilation of the lungs and the energy of the stretched, elastic fibres is impaired. The result of this is a prolonged and labored expiration, in which the expiratory sound is formed by the sonorous and sibilant râles. In the third stage the lumen of the bronchi is reduced to a minute canal. The vesicles are distended to their utmost capacity; the bronchial mucous membrane is greatly swollen, and the diaphragm is either in a state of spasm or fixed and crowded by the over-distended lung. The greater portion of the air within the lung is residual air and there is no current except in the bronchi of larger calibre; aëration is performed slowly by the interchange of gases in this portion of the lung. There is no action of the vesicles or the diaphragm, and no expiration is heard; the inspiratory sound is produced by the passage of air through the glottis and larger bronchi. In some cases we can also see transition periods in which the first stage is verging into the second—shown by the presence of inspiration commencing with a blowing râle and ending in a sibilant; or with a blowing râle on inspiration and a sibilant or sonorous râle on expiration. The transition of the second to the third stage is seen in shortened expiratory râles which disappear completely as it lapses into the full third stage.

These different stages of asthma occur in the same individual at

different times, although a certain similarity of type is apt to occur in different individuals. That they are simply stages of the same process, and that the varying physical sounds are all due to a narrowing of the bronchi, are fully proven by the effects of therapeutic efforts. For example, the inhalation of nitrite of amyl, or an application of carbolate of iodine to the larynx, will often instantly change the inspiratory whiff of the third stage to the prolonged expiration with the sibilant and sonorous râles of the second. This change is at once realized by the patient in a loosening of the constriction of the chest, and greater comfort and freedom of breathing. We can also, through the same means, produce a change from the whistling râles of the labored expiration of the second stage to the blowing râles of the first. When the asthmatic is subjected to some additional source of irritation, we find the increased distress of the patient explained by the change from the first to the second stage, or the second to the third. Although the asthmatic paroxysm is essentially due to a bronchial obstruction, we find it quite frequently interchangeable, and at times complicated with spasm of the glottis and spasm of the diaphragm. In one case, of a lady sixty years of age, I have seen a pure asthmatic spasm subside and followed in a few days by a distinct spasm of the glottis, with entire absence of asthmatic breathing; and again, in her next attack, glottic and bronchial spasm were absent, and spasm of the diaphragm was present. At this time a feeling of intense constriction was felt over the diaphragm, and the breathing was almost entirely superior costal, with a complete absence of the asthmatic râles. The sense of constriction in the upper part of the chest seen in the asthmatic, was wanting. In another case I have seen a true asthmatic paroxysm complicated, and at times synchronous, with spasm of the glottis. In this case the asthma disappeared, but the man died suddenly from glottic spasm. These conditions cannot be considered in reality as part of asthma, although often complicating it. They bear the same relation to the asthmatic paroxysm as exists in many other nerve disorders. For example, migraine, epilepsy, neuralgia, and insanity, are all interchangeable with asthma, and in families showing a disposition to nerve disorders they may be found in different individuals. That bronchitis and emphysema ultimately arise as sequelæ of asthma, is clearly probable, as the continued disturbance of the normal condition of the bronchial mucous membrane is apt to produce and incite pathological changes; and the great and frequent disturbance of the elastic fibres of the vesicle can only result in weakening and loss of tone. The right ventricle must also frequently suffer, undergoing dilatation and hypertrophy, as the great distention of the walls of the vesicles must seriously interfere with the normal pulmonary circulation.

The mechanism by which the asthmatic paroxysm is caused, has always been the subject of dispute and controversy. Laennec, followed

by Andral, ascribed it to spasm of the circular fibres of the bronchi, causing cylindrical narrowing of these tubes. This may be said to be the prevailing doctrine at the present day, and it has been endorsed by many of the most eminent authorities in medicine; among these may be mentioned the names of C. J. B. Williams, Bergson, Hyde Salter, Trousseau, and Biermer. Rieseisen having demonstrated the existence of the circular fibres of the bronchi, others have sought to prove their capability of contraction under certain stimuli. Longet and Volkmann especially claim to have accomplished this by means of electro-stimulation of the vagus, but this result has not been produced when the experiments have been carried out by others. The theory of bronchial spasm as an element of the asthmatic paroxysm, has been warmly disputed. Budd rejected the idea, and he has been followed by Wintrich, Bamberger, Germain Sée, and others. Duchenne having demonstrated that faradization of the phrenic nerve caused spasm of the diaphragm, was inclined to consider this as an essential element of the paroxysm. In this he was supported by Wintrich and Bamberger. Traube denied the nervous origin of asthma, and ascribed the dyspnoea to the fluctuatory hyperæmia of the bronchial mucous membrane. He supposed certain persons to have a certain predisposition to asthma, and that the predisposition consisted in a deficiency of the elastic fibre in the lung, allowing a ready distention of the bloodvessels, and thus allowing a ready swelling of the bronchial mucous membrane. Sanderson ascribes the paroxysm to a dependency on a change in the respiratory function of the vocal cords. He believes this to be an extreme relaxation of the vocal cords during slumber, and a narrowing of the rima glottidis. Beau considers asthma to be a bronchial catarrh with viscid secretions. Leyden ascribes the attack to be due to the presence in the bronchi of a peculiar kind of octahedral crystals produced from white blood-corpuscles, which irritate the pulmonary filaments of the vagus, and provoke the bronchial spasm. Weber considers asthma to be a vasomotor neurosis in which an acute catarrh with a dilatation of the vessels of the bronchial mucous membrane is produced. In this theory he has been followed by Störck, who asserts the existence of tracheal congestion as shown by the laryngoscopic mirror. Lately, Sir Andrew Clark has described a condition of the bronchial mucous membrane simulating the wheals of urticaria on the skin, and has sought to prove this to be a pathological condition of the disorder.

That the theory of spasm of the bronchial muscles is the prevailing one must be admitted, but it stands more in the light of medical tradition than proven fact. The experiments made to prove the contractibility of the bronchial fibres by irritation of the vagus have been conflicting, and the untenability of the theory has been notably disproved, both on clinical and experimental grounds, by Wintrich and Germain



Sée. The fact of the circular fibres being of the unstriped variety, in which the contraction must be slow and gradual, absolutely negatives their coöperation in the sudden and transient narrowing necessary to produce the phenomena of asthma. The office of the bronchial muscles seems more probably to be that of supporting muscles, regulating and supporting the bronchi against atmospheric pressure and undue violence of exertion. The recent experiments of Riegel and Edinger have shown conclusively that irritation of the vagus does not provoke a bronchial spasm, but rather a spasm of the diaphragm; Biermer, the earnest defender of the theory of bronchial contractibility, is forced to say that although stimulation of the vagus may not produce marked contractions of the bronchial muscles, we have not yet found the proper experiments necessary to prove it, and possibly the stimulation must be to the pulmonary sympathetic plexus rather than to the vagus. That spasm of the glottis and spasm of the diaphragm occur in the asthmatic cannot be denied by any one who has made a study of the disorder; the symptoms of those conditions are so marked, and their occurrence so frequent, that they cannot be overlooked; but that they are part of the essential nature of asthma is not true, as we find many cases of asthma in which they are wanting. Spasm of the diaphragm can never produce the mechanical rôles always found in asthma, although in certain cases it may play an important part in producing the great distention of lung vesicles seen in the later stage of the disease. The theory of Weber, that the paroxysm is due to vasomotor turgescence or dilatation of the mucous membrane of the bronchi, finds complete support in the clinical picture of asthma: the transient and rapid variations of the physical sounds, the presence of the dry and moist râles, and the acute distention of the lungs seen in pronounced attacks of the disease. This theory, however, is directly contradictory to the acknowledged physiological effect of the drugs which are generally recognized as most useful in allaying the paroxysm; the nitrites, chloral, and morphia are all known as relaxants and anti-spasmodics, and their use could only increase the distress if the dyspnœa was due to a vasomotor dilatation of the vessels of the bronchial mucous membrane. The action of chloral and morphia could be explained by their effect on the nerve-centres; but the efficacy of the nitrites finds here no support. The physiological action of venous blood and carbonic acid on the arterioles and their actual effect in asthma negative the existence of a vasomotor dilatation of the arterioles as a cause of the paroxysm. Ludwig and Severini have shown that venous blood, when circulated for a length of time, causes the vessels to dilate, and that a large amount of carbonic acid in the blood causes a dilatation of the vessels. The natural sequence of an asthmatic paroxysm is extreme venosity of the blood, with an accumulation of carbonic acid through its imperfect aëration. These

conditions in reality existing to such an extreme degree in the asthmatic paroxysm, would simply increase the paroxysm if the disturbance were due to vasomotor paralysis of the vessels; whilst, in fact, we find them to be essential elements in the natural cessation of the attack.

In a paper read before the American Laryngological Society, at Detroit, in 1885, I described a condition of the nasal mucous membrane seen in certain patients. This condition is characterized by pallor, swelling, and an œdematous condition of the membrane. When irritated as by the touch of a probe or any other irritant, the swelling is increased and a profuse, thin or watery secretion is poured out. This condition promptly subsides after the inhalation of nitrite of amyl, ether, or the instillation of atropine or morphia; but remains unchanged on the application of cocaine. These cases occurred in persons of a marked nervo-vascular temperament, and in whom functional nerve disturbances were common. The existence of pallor, more or less marked, and a marked œdematous condition of the mucous membrane, distinguish this condition from that ordinarily seen in vasomotor catarrh. In the latter condition there is hyperæmia with dilatation of the vessels; but in the former the pallor completely negatives the idea of a dilated condition of the vessels, and the opposite condition must exist. The action of the drugs indicated in these cases rather a spasm of the arterioles, and I have chosen to consider the disturbance of the nasal membrane to be due to a vasomotor spasm of the arterioles of the membrane. The following case, in which this peculiar condition was the accompaniment of a facial neuralgia, is presented as a perfect type of the condition:

A. M., merchant, florid, stout, about forty-five years of age, was brought to me, complaining of facial neuralgia of the left side and great obstruction in the nostril of that side. He said that this obstruction of the nostril had occurred simultaneously with the attack of the neuralgia; that at times it was so great as completely to close the canal. There was a profuse discharge of a thin, limpid fluid, which was greatly increased on the application of any irritant, such as dust, or the touch of the probe. These same agents also had a marked effect in increasing the swelling of the cavernous tissue. On inspection the right nostril was found normal; the left nostril was almost completely occluded by the pallid membrane of the swollen cavernous bodies, almost as pale as that seen in a corpse. It presented an œdematous, boggy appearance, as if the whole tissue was saturated with secretion, and on any irritation this was poured out in a profuse discharge of a thin, limpid character. This entirely subsided with a subsidence of the facial neuralgia.

A study of these cases led me to surmise that possibly an analogous condition may exist in the mucous membrane of the bronchi during asthmatic attacks. I examined a large number of asthmatics during the paroxysm with the laryngoscope mirror, and found that during the paroxysms the mucous membrane of the pharynx, including the uvula, presented a similar pallid, œdematous appearance; that the membranes

of the larynx and trachea appeared paler and more swollen than normal, but not so œdematous as that of the pharynx. When portions of the membrane were inflamed, as is common in asthma, the inflamed area presented more the pale red of an intensely anæmic or phthisical subject than the rosy red of ordinary hyperæmia or inflammation. This is in direct contradiction to the observation of Störck, who claims to have found the larynx and trachea congested during the attack. If these conditions can be seen to exist during the asthmatic paroxysms in the upper air-passages as far as inspection is possible, I think we are fully justifiable in reasoning that an analogous condition exists in the bronchi. The normal functional differences between the mucous membrane of the bronchi and that of the upper air-passages would somewhat change the picture, more especially as the excessive glandular secretions would be greatly diminished in quantity or even wanting. A similar condition to this we find existing in the sympathico-tonica type of migraine (Eulenburg), with vascular spasm and diminished supply of blood in the brain.

I would, then, consider asthma to be a disorder of vascular irritability; that the paroxysm is directly due to a partial occlusion or cylindrical narrowing of the lumen of the bronchi through the swelling of the bronchial mucous membrane; that this swelling is caused by a vasomotor spasm of the arterioles with a saturation of the tissues by the liquor sanguinis; this condition is accompanied by a general high blood pressure.

With this theory we find a complete explanation of all the physical signs of asthma. We see the possibility of the rapid changes of physical signs observed during the paroxysms, and we have in its support the physiological action of all the drugs which experience proves to be of value in allaying the paroxysm—the nitrite of amyl, morphia, chloral, lobelia, and iodide of potash in their action allay the spasm at the same time that they tend to reduce general blood pressure; whilst drugs like the bromides prove of little value in breaking the paroxysms when once in force, although they are serviceable in preventing a recurrence.

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#### ENVIRONMENT IN ITS RELATION TO THE PROGRESS OF BACTERIAL INVASION IN TUBERCULOSIS.

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THOUGH much light has been thrown of late on the etiology of tuberculosis by the labors of Koch, Baumgarten, Weigert, and others, the conditions which lead to tubercular infection are yet shrouded in



mystery, and many clinical facts and teachings remain seemingly at variance with the new doctrine. The older clinical medicine on one side points to unhygienic surroundings, malnutrition, struma, defect of anatomical structure, and heredity as the main causes of tubercular disease, while experimental research brings evidence not easily to be thrust aside to support its claim to have discovered in the bacillus tuberculosis the virus which is essential to the production of this fatal class of maladies.

The acknowledged causes of consumption may conveniently be divided into those operating before, and after birth, the former coming under the general heading of heredity, the latter of environment. The problems of heredity are most complex and reach, as yet, far into the domain of hypothesis; but the effect of environment in its relation to bacillary invasion may more readily be subjected to study. So much do certain conditions of air, light, food, and especially habitation influence the etiological history of the development of consumption that a prediction as to the prevalence of the disease in any given locality may often be based on a thorough knowledge of these conditions. Drs. Bowditch and Pepper<sup>1</sup> in this country, and Dr. Buchman<sup>2</sup> in England, have done most valuable work in this direction and the results of their labors alone seem sufficient to establish the fact that environment is a most potent factor in the causation of tuberculosis. What, however, are its relations, if any, to the development and progress of bacillary invasion? To determine how far extremes of environment favor or arrest the progress of germ infection and to what degree they are mutually or independently concerned in the causation of tuberculosis, has been the object of this research and an answer to the three following questions sought.

*First.* What results ensue when both bacillary infection and unhygienic surroundings are made to coexist in tuberculosis?

*Second.* Are unhygienic surroundings, when every known precaution has been taken to exclude the bacillus, sufficient of themselves to bring about the disease?

*Third.* Is bacillary infection invariably progressive in animals placed under the best conditions of environment attainable?

EXPERIMENTS.—Fifteen rabbits were made use of and divided in three lots, each set of animals being placed under conditions best adapted to answer in the results noted the three questions already referred to.

*Experiment No. 1.* Five rabbits were inoculated in the right lung and in the left side of the neck with five minims of sterilized water in which was suspended a sufficient quantity of a pure culture (third generation) of the tubercle bacillus to render the liquid quite perceptibly turbid.

<sup>1</sup> New York Medical Journal, Dec. 4, 1886.

<sup>2</sup> Ninth and Tenth Report, Medical Officer, Privy Council, 65-67.

The needle of the Koch's inoculating syringe was inserted subcutaneously on the left side of the neck and in the third intercostal space to a depth of thirty millimetres on the right side. These animals were then confined in a small box and put in a dark cellar. They were thus deprived of light, fresh air, and exercise, and were also stinted in the quantity of food given them while being themselves artificially infected with the tubercle bacillus.

*Experiment No. 2.* Five healthy rabbits were placed under the following conditions: A fresh hole about ten feet deep was dug in the middle of a field, and the animals having been confined in a small box with high sides but no top, were lowered to the bottom of this pit, the mouth of which was then covered with boards and fresh earth. Through this covering a small trap door was cut which was only opened long enough each day to allow of the food, consisting of a small potato to each rabbit, being thrown to the animals. So damp was the ground at the bottom of this pit that the box in which the rabbits were confined was constantly wet. Thus these animals were deprived of light, fresh air, and exercise, furnished with but a scanty supply of food while breathing a chill and damp atmosphere, though free from disease themselves and removed as far as possible from any accidental source of bacterial infection.

*Experiment No. 3.* Five rabbits having been inoculated in precisely the same manner as the animals in the first experiment, were at once turned loose on a small island in June, 1886. It would be difficult to imagine conditions better suited to stimulate the vitality of these animals to the highest point than were here provided. They lived all the time in the sunshine and fresh air, and soon acquired the habit of constant motion so common in wild animals. The grass and green shrubs on the island afforded all the fresh food necessary and in addition they were daily provided with an abundant supply of vegetables. Thus, while artificially infected themselves they were placed in the midst of conditions well adapted to stimulate their vital powers to the highest point attainable.

RESULTS.—*Experiment No. 1.* Four of the inoculated rabbits confined in the cellar died within three months: in all of them the injected lung was extensively diseased; the other lung and the bronchial glands being also more or less involved and tubercles in various stages, but sufficiently advanced to be macroscopical, were found in the pleura, peritoneum, spleen, and liver; from these lesions pure cultures of tubercle bacilli were obtained. The fifth rabbit survived and was killed four months after injection; at the autopsy the right lung was found solidified and shrivelled, the upper portion being almost entirely destroyed, while a bronchial gland as large as a hazelnut, filled with creamy pus, occupied the right chest; tubercles, which in many places had become cheesy, studded the upper portion of the left lung. The other organs were healthy.

*Experiment No. 2.* The five uninoculated and healthy rabbits placed in the damp pit were all living at the end of four months. They were emaciated and their coats were rough, but they still seemed about as active as at the beginning of the experiment. They were all killed within a few days of each other, but a careful examination of their organs revealed nothing abnormal in any of them.

*Experiment No. 3.* One of the five rabbits which were allowed to run at large died just one month after inoculation. The lower portion of the lung was solidified, the bronchial glands enlarged, as well as the axillary glands on the left side, and a few tubercles were made out in the spleen. The left lung and all the other organs were sound. The four other rabbits remained apparently in perfect health, and so active had they become that two of them could only be captured with the aid of a gun. All four animals were killed at the beginning of November, or four months after inoculation. They were loaded with adipose tissue and their flesh was so firm and red as to be in striking contrast to the blanched and flabby muscles of the other rabbits previously examined. All the organs were healthy and even the points of inoculation could not be made out.

A review of the evidence afforded by these experiments confirms the view that the production of tuberculosis is a most complex problem and one in which many elements besides the bacillus enter. How surely and rapidly this microbe accomplishes its work when the normal resisting power of the system is for any cause lowered, is well shown by the manner in which the first lot of animals succumbed. Localized tuberculosis was in every instance but one quickly followed by general systemic infection and death. That animals kept in most laboratories are frequently confined under conditions of air, light, and overcrowding, which may materially influence the results of investigations in a disease of the nature of tuberculosis, can hardly be denied and should be kept in view.

Necessarily imperfect so far as affording protection from bacillary infection as were the conditions under which the animals in Experiment No. 2 were placed, the results obtained seem to indicate that unfavorable environment and the consequent malnutrition which invariably follows existence amidst unhygienic surroundings are not sufficient of themselves to cause tuberculosis. The fate of the animals allowed to run wild is most instructive, inasmuch as it seems to indicate that in a great majority of instances resistance to the invasion of so deadly a germ as the tubercle bacillus is possible in the artificially produced disease, provided the vital and nutritive processes of the animal are stimulated to the highest possible state of activity.

In estimating, however, the power of environment in rendering these rabbits insusceptible to the disease, it must be remembered that in them the tuberculosis was an artificial one, produced in previously sound animals, and not the culmination, as in the spontaneous disease in man and animals of many debilitating causes, acting often through long periods of time, and impairing the resisting power of the system to such a degree as to allow of spontaneous infection. That incipient phthisis is frequently recovered from is demonstrated by the results of autopsies on individuals dying from other causes, and by a long list of clinical observations. The interesting cases of tubercular inoculation in circum-



cised children recently reported by Lehman,<sup>1</sup> furnish proof that so large a number as thirty per cent. of recoveries may occur, after artificial inoculation, even when profound systemic infection has existed. Experimental research has already furnished proof of the potency of environment in determining microbic diseases in animals otherwise insusceptible. Thus, Pasteur<sup>2</sup> succeeded in killing hens with anthrax, after reducing their naturally high temperature by keeping them partially immersed in cold water, though these birds in their usual surroundings are proof against this microbe. Gibier<sup>3</sup> gave the same disease to fish, and Metzhinkoff<sup>4</sup> to frogs, by warming the water in which they lived, after failing to infect them in their natural environment. Wild animals and game birds, which, in their wild state, are never known to die of tuberculosis, rapidly succumb to the malady when placed in confinement, and the North American Indians, among whom phthisis is practically unknown while living a savage life, are decimated by consumption when placed under the trying restrictions of a more civilized mode of existence.

If, therefore, environment is so potent a factor in determining bacterial infection, are its effects on the future course of the malady when it has occurred to be disregarded? How potent may be its influence is demonstrated by the widely differing results obtained in the inoculated rabbits allowed to run wild, and those confined amidst unhygienic surroundings. That it is not, however, more than a predisposing cause of the disease, seems indicated by the survival of the animals in Experiment No. 2, which, though they were deprived of fresh air, light, and exercise, and stinted in the amount and quality of their food for over three months, developed no organic lesions. Thus it would seem that the local mischief having been produced, the future type assumed by the morbid processes, and even the ultimate result, is greatly dependent on the resisting power evinced by the individual, which may be computed as the sum total of all the conditions which affect individual vitality through heredity and environment.

The two ultimate elements in this struggle for existence are the bacillus and the cell. Though in its infancy, bacteriology already points to the cell as an active factor in resisting the progress of bacterial invasion. Metzhinkoff<sup>5</sup> saw the lymph cells of the frog englobe and destroy anthrax bacilli, and Wyssokowitsch<sup>6</sup> found the microbes which he injected in the circulation of animals, taken up by the endothelial cells lining the capillaries of various organs, where they finally became destroyed. Suppuration is now being looked upon by some as a con-

<sup>1</sup> Deutsch. med. Wochens., 1886, Nos. 9-13.

<sup>2</sup> Les Bacteries, Cornil and Babes, page 582.

<sup>4</sup> Virchow's Archiv, vol. xlviii. p. 503.

<sup>3</sup> Ibid., page 581.

<sup>5</sup> Virchow's Archiv, vol. xlviii. p. 503.

<sup>6</sup> Ueber die Shicksal der ins blut injicerten Mikroorganism. Zeitschrift für Hygiene, Bd. i. Heft 1.

servative process in which the leucocytes are thrown out in great numbers, to destroy bacteria, and as a barrier to systemic infection. The peculiar relation of the bacilli to the nuclei in the giant cells themselves, suggests the possibility of an antagonism between the two. As the pathogenic qualities of infectious germs may in many instances be abrogated or diminished at will, as in the preliminary manipulation of bacteria used in vaccinations, by placing them under peculiar conditions of environment which rob them of their virulence, or modify it, so may the resisting power of their natural enemies, the cells of the body, be diminished or increased by the same means. Watson Cheyne,<sup>1</sup> in a review of some of his recent experiments, after describing the manner in which large quantities of putrefactive and non-pathogenic bacteria are destroyed when injected into the blood-current of rabbits, adds "but this does not occur if the animal is in a bad state of health."

Viewed in this light, the teachings of clinical medicine, the knowledge obtained by a study of the therapeutics of the disease, and the proof offered by experimental research, are in perfect accord. All measures which tend to increase the vitality of the body cells have been found to be precisely those which are most effectual in combating tuberculosis; one by one, specific methods of treatment, which for a season enjoyed popularity, have fallen into disuse, and hygiene, climate, and feeding—in other words, a favorable environment—have alone given results which have stood the test of time.

A consideration of the evidence offered by this study, therefore, teaches that though environment may bear but the relation of a predisposing cause to microbic infection, it is, nevertheless, a potent factor in determining the future type, and even the final results of the disease, and that if we may not under-estimate the pathogenic properties of the bacillus, the effect of extremes of environment on the resisting power of the cells of the body is an element in this complex problem which should not be ignored.

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## THE PUPIL IN ITS SEMEIOLOGICAL ASPECTS.

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MANY observations have been made, from numerous standpoints, regarding pupillary conditions, yet with a few notable exceptions, they have been studied in an isolated manner, relative to the particular disease or lesion of which they might be more or less symptomatic. They have

<sup>1</sup> Bacteriology. Amer. Journ. Med. Sci., January, 1887.

been often looked upon, and are still regarded by some, as curious, interesting, but erratic phenomena, far too variable to be depended upon, and without any connecting thread upon which these conditions, as seen in a variety of diseases, could be strung. Few attempts have been made to grasp pupillary manifestations as a whole, still fewer to reduce the varying phenomena to principles or to reduce the laws by which they are controlled.

Among the papers dealing with the pupil as a whole, that of Dr. Alph. Drouin is one of the most complete, and the writer is indebted to that work for information, especially from the section devoted to anatomy and physiology. Mr. Hutchinson's excellent papers on the "Symptom Significance of Different States of the Pupil," published in the first volume of *Brain*, contain much that is of value, to which the reader's attention is directed.

In the present paper it is intended to give, first, with the view of refreshing the mind of the reader, a brief outline of the physiological phenomena pertaining to the movements of the pupil, and thereafter to present a series of personal observations from which certain conclusions have been drawn.

**PHYSIOLOGICAL OUTLINE.**—The optic nerves have no direct control over the pupil. The impression produced by light falling upon the retina passes through the second nerves to the corpora quadrigemina, which communicate an impulse to the oculomotor centres, and so cause pupillary contraction. The second is thus the afferent nerve in this reflex (excito-motor) action. This reflex phenomenon may be brought about not only by the impression of light upon the retina, but also by mechanical stimulation of the optic nerves, which induces in them a sensation of light. When both optic nerves are divided or paralyzed, dilatation and immobility of the pupils ensue. Paralysis of one optic nerve produces dilatation of the pupil with blindness on the same side as the lesion; but owing to the preservation of consensual movements the pupil of the injured eye contracts when impressions of light are made upon the sound retina, though these are quicker and stronger on the sound side. Therefore, pupillary phenomena are sometimes wanting when only one optic is paralyzed, owing to the preservation of consensual movements; in this way it differs from unilateral lesions of the third, which always affect the corresponding pupil in a very definite way. Section or destruction of one optic tract produces dilatation of the opposite pupil, and blindness of the opposite eye.

The third nerve takes origin beneath the floor of the aqueduct of Sylvius, and supplies the ciliary muscle and sphincter of the iris, besides all the muscles of the globe with the exception of the external rectus and superior oblique. When the third nerve is stimulated contraction of the pupil on the same side ensues, and when it is divided or paralyzed



the pupil dilates; it no longer responds to the action of light, and accommodation is abolished. When the central portion of a cut oculomotor is stimulated, the opposite pupil becomes contracted, provided the nerve on the opposite side remains intact. In mydriasis as a sequent of oculomotor paralysis, the pupil may be made to dilate still further by either stimulating the sympathetic, or by the action of atropine. In man, pathological lesions of the third nerve generally result in mydriasis, though the writer has seen a case of a contracted pupil due to neuritis of the third on the same side; and M. Voisin found in one instance, in the case of a general paralytic who had unequal pupils, one of which was contracted, that there was an effusion of blood into the nucleus of origin of the third on the same side. Besides its action on the pupil, paralysis of the third when complete causes paralytic ptosis, strabismus outward and downward, slight protrusion, and immobility of the eyeball. There is, of course, inability to adduct the eyeball, and consequent double vision. It is well to recollect that paralysis may be confined to individual branches of the nerve. Unilateral affections of the third show themselves in the pupil on the same side as the lesion in the brain. Intracranial unilateral section of the fifth nerve causes on the same side as the lesion, fixity of the eyeball, contraction and immobility of the pupil. The want of sensibility soon leads to inflammation and ultimate destruction of the eyeball. The same pupillary effect is produced on section of the sympathetic, and some suppose that the action of the fifth on the pupil is due to the vasomotor filaments which it contains.

The centre for dilatation of the pupil is situated in the medulla oblongata. Thence the fibres make their exit partly through the trigeminus, partly through the lateral columns of the cord, in the cilio-spinal region (from the sixth cervical to the third dorsal vertebræ), passing out by the two lowest cervical and the first two dorsal nerves into the cervical sympathetic. The latter fibres find their way to the iris, not only through the cervical sympathetic, but also by the cavernous plexus, lenticular ganglion, and ciliary nerves. It may be interesting to note, as having a bearing on the question of the power of the vasomotor system on the iris, that Landois and Stirling state that though the vasomotor and oculo-pupillary fibres "lie in the same trunk in the neck they do not issue from the cord by the same nerve roots; the latter come out of the cord with the anterior roots of the first and second dorsal nerves (dog), while section of the cord between the second and fourth dorsal vertebræ produces the vasomotor changes only."<sup>1</sup> It may, however, be difficult to ascertain whether the latter sections produce direct pupillary effects, as the pupil may be influenced by the state of the bloodvessels. More definite information on this point is necessary.

<sup>1</sup> Ferrier states that in the monkey the second dorsal is the only nerve issuing from the cilio-spinal axis which produces dilatation of the pupil on irritation.

When the cervical sympathetic is stimulated, dilatation of the pupil ensues; and when it is divided or paralyzed, the pupil contracts. Similar results follow like causes applied to the medulla, and especially to the ciliospinal zone. Budge describes this as the centre for the dilatation of the pupil, and it may be looked upon as a secondary centre. If it be admitted that there are radiating fibres in the iris, then these are innervated by the sympathetic, causing dilatation of the pupil, while the oculomotor innervates the circular fibres. But Rouget, and many others, do not admit the existence of radiating fibres, explaining the action of the cilio-spinal axis on the pupil as being due solely to its vasomotor control.

When the cervical sympathetic is divided, the vessels of the corresponding side of the head, face, ear, and mucous membrane of the mouth, become dilated; there is sweating on that side of the head, elevation of temperature, the vessels of the iris are engorged with blood, and there is contraction of the pupil. If the peripheral end of the cut sympathetic be electrically stimulated all these phenomena disappear, and the pupil dilates. Many infer from these and other phenomena, that the action of the sympathetic on the pupil is exercised through the intermediary of the bloodvessels.

Unilateral excitation of the cord in the ciliospinal region produces dilatation of the pupil on the same side. Although the ciliospinal zone is specially susceptible to impressions giving rise to pupillary phenomena, yet irritation applied to almost any part of the cord is apt to be followed by dilatation of the pupil. This centre is likewise connected with the afferent sensory nerves, so that painful impressions on the skin and mucous membranes may reflexly produce dilatation of the pupils.

When the corpora quadrigemina are irritated, both pupils contract, and when destroyed, dilatation with immobility of pupils and destruction of sight ensue. It will be observed, that the pupillary effect is similar to that produced by lesions of the third nerve.

Were Longet's observation correct, one could remove from an animal the whole brain, with the exception of the corpora quadrigemina, without producing any pupillary indication. The writer would like to have further evidence on this point before accepting this statement as a fact.<sup>1</sup> Even were it the case, it would, as M. Drouin points out, not be correct to conclude that lesions of the cortical masses have no effect upon the movements of the iris, as various encephalic modifications have distinctive pupillary indications. It is supposed that there are two cortical motor centres for the pupil; the one situated in the base of the first and second frontal convolutions, which, on irritation, causes dilatation of the pupil

<sup>1</sup> Ferrier states that in animals deprived of their cerebral hemispheres, a flash of light before their eyes will cause the pupils to contract. Judging from this, the pupils must be either medium or dilated in such cases.

through the ciliospinal subcentre; the other located in the angular gyrus, connected with the nucleus of the third nerve by means of centrifugal fibres, which, when irritated, causes contraction of the iris with convergent eyes. These two centres in the cortex of the brain, stated to be connected so precisely, the one with the spinal centre, the other with the oculomotor beneath the aqueduct of Sylvius, are not yet definitely established, and in some measure are yet inferential.

In considering the manner in which cerebral lesions may act upon the pupils, it is necessary to weigh the possible participation of the various nerve centres, and the effects of modifications of the brain as a whole upon them, and also the relation of the state of the cerebral circulation to that of the iris.

The phenomena produced by lesions of the cerebellum upon the pupil are varied, generally myosis, occasionally mydriasis; both being accompanied by strabismus.

Meningeal affections may extend so widely that many parts of the brain and basal nerves may be implicated; and probably by reflex sympathetic action, changes may be induced in the eye and iris. When one remembers that the internal carotid supplies both the pia mater and globe of the eye, and that the same vasomotor centre supplies the vascular nerves of those arterial branches, the influence of the meningeal affections over the iris may be understood.

There is considerable divergence of opinion regarding the manner in which certain pupillary movements are brought about, and also as to the exact mechanism controlling these movements. While all admit the existence of the sphincter of the iris, there is no unanimity as to the mode by which dilatation is effected. While some believe that there are muscular radiating fibres whose function it is to dilate the iris, others deny their existence, believing that the dilatation and contraction of accommodation take place in virtue of the inherent elasticity of the iris. Those holding the latter view say, physiology shows that the movements of the iris are controlled in two ways, the one being functional or active, relating to accommodation during the exercise of vision, the other being passive, depending on the variations of the circulation in the encephalon and iris. The former movements are those arising from the impressions of light on the retina communicated through the second nerve to the corpora quadrigemina, which produce contraction of the pupil through the oculomotor acting on the iris. In those functional movements the changes in the pupil are brought about by the elasticity of the iris. The passive or vascular alterations of calibre are quite of a different character, and are independent of visual impressions, though the power of accommodation may remain. In those the movements of the pupil are regulated by the vascular system of the iris, which is in complete harmony with that of the encephalon. Myosis ensues when the vessels



of the encephalon and those of the iris are dilated; and dilatation of the pupil corresponds to anæmia of the encephalon and iris. It is in this way that congestion of the brain and its membranes, the result of paralysis of the cervical sympathetic, produces fluxion or paralytic dilatation of the vessels of the iris and contraction of the pupil; while in irritation of the sympathetic, in ischæmia of the brain, due to epilepsy, syncope, strong moral emotions, powerful irritation of the sensory nerves, etc., the vessels of the iris being contracted, mydriasis ensues. Regarding the action the various states of the encephalon might have on the pupils, it is said that one has only to determine what effect the lesions have on the circulation. Prominent among those who have advocated this view is Mosso, of Turin, who declares that the size of the pupil follows exactly the oscillations of the bloodvessels, and M. Drouin warmly espouses the same view, regarding the pupil as the manometer of the cerebral circulation. M. François Frank refutes this theory, and states that the movements of the pupil are quite independent of the condition of the bloodvessels; the evidence he advances in support is far from conclusive.

There is this difference between the influence exerted on the pupil by cerebral affections and those arising from the ciliospinal axis, the former can affect the size of the pupil in two ways: first, through the medium of the bloodvessels, second, by injuring the apparatus controlling the functional movements of the iris (the optic and oculomotor nerves and corpora quadrigemina); while the latter, the ciliospinal, can affect the pupils in only one way, by means of the reflex phenomena determining dilatation and contraction of the vessels.

METHOD OF EXAMINING THE PUPIL.—In examining the pupil, the shape, size, activity, and any difference existing between the two pupils, should be noted. The following rules ought to be attended to. The patient ought to face some source of light, such as a window.

1. Both eyelids ought to be closed, and after the lapse of a few seconds both ought to be simultaneously opened, when the observer should note whether they contract equally.

2. One eyelid should then be closed for half a minute; observe on opening it whether there be immediate contraction in that pupil, and whether simultaneous contraction takes place in the opposite pupil. The same should be repeated in the opposite eye. By this means an amaurotic eye would be detected, as in it the consensual movement persists, while the direct movements are abolished.

*Pupilmeters.* Many pupilmeters have been invented, such as those of Olbers, Follin, Fick, Badel, Galezowski, Landolt, Gorham, etc., some of them being ingenious instruments. For practical purposes, however, Hutchinson's idea of the disk of polished steel, with holes punched in it, or the simple narrow white card, having marked on it a

series of black dots, measuring from one to nine millimetres, is sufficient. When in use it is placed close to the eye, and the dot which corresponds most to the size of the pupil is noted, and its exact size in millimetres is read off. This has been employed by M. Drouin, and Dr. Finlayson figures it in his work on clinical medicine. The widest dilatation of the iris never exceeds nine millimetres.

PERSONAL OBSERVATIONS ON THE PUPILS.—The data upon which the following remarks are founded are based upon personal experience. The various facts were gleaned and recorded as isolated phenomena. It was only in reviewing and collating these, the conception evolved, that, besides the effect on the pupil of lesions of certain brain and spinal centres and their nerves, there were general cerebral conditions, which were accompanied by definite pupillary phenomena, with sufficient constancy to enable conclusions to be formulated regarding them. When these pupillary states are fenced with proper reservations, they form valuable aids to the diagnosis of some of the general conditions of the brain.

When the function of the brain is temporarily suspended, the pupils are in a state of *stabile mydriasis*. It matters not what the cause of this suspension of function may be, the pupillary phenomena are identical as long as this condition lasts.

In peripheral injuries, involving large extents of surface, such as the mangling of both thighs by a railway accident, a state of shock is frequently induced, in which, along with complete insensibility and the usual accompanying phenomena, the pupils are widely dilated and fixed. Reaction in such cases is often heralded by an alteration in the pupillary state, the mydriasis giving way somewhat, the pupil at the same time becoming mobile, and soon after, vomiting or other sign of reaction sets in. The same phenomena are seen when shock is induced by blows upon the epigastrium, by severe pain, such as may be occasioned by injury of the testicle, and by powerful mental impressions. Again, when, instead of the injury being peripheral, it is applied to the brain itself, and is of sufficient severity to cause suspension of the cerebral function, the pupils are widely dilated and fixed.

As to this state of central shock or cerebral concussion, writers are at variance with one another concerning the pupillary condition attending it. Some state that the pupils are dilated, others that they are contracted, most that they are variable, while a few state that they are unequal. Hospital surgeons, who make a daily or a less frequent visit to their wards, have few opportunities of seeing uncomplicated cases of concussion of the brain, as in the majority of instances the phenomena attending this condition pass off within a period of hours, and in many before the patient reaches the hospital. As an "interne" in the Royal Infirmary, the writer witnessed a number of such cases, the symptoms

in each of these passing off in a few hours; and afterward, while occupying the post of Casualty Surgeon in Glasgow, the writer had the fortune of seeing, and the opportunity of observing to a conclusion, at least twenty well-marked instances. The data thus derived pointed clearly to the conclusion that in uncomplicated cases of concussion the pupils are widely dilated and fixed. One of the earliest indications of recovery from this state is to be found in the pupils, the wide dilatation relaxing somewhat, accompanied by a slight mobility. During the period of rallying the pupil is very variable, and generally more or less contracted. In cases of concussion, which are complicated by brain lesion, such as slight compression, the pupillary phenomena, the result of concussion, remain until the latter state passes off, when the slight compression manifests itself, among other ways, by a pupillary state, such as inequality, contraction, etc. In this way, concussion may temporarily mask other and more serious, though more limited brain lesions, which may manifest themselves when it has subsided. If these two conditions are not discriminated, the pupillary phenomena of the one may be attributed to that of the other.

In hemorrhage considerable loss of blood may be borne without inducing marked pupillary changes, as long as the blood be not removed from the body so rapidly as to induce syncope. When, however, the amount of blood lost is great, equalling one-seventh of the whole, the cerebral irritability is increased, and is accompanied by myosis. When the depletion is carried much further, so that the amount lost is equal to one-fifth of the whole, the cerebral anæmia is so great as seriously to reduce the functional power of the brain; then the pupils are dilated, and if this depletion be pushed so as to induce syncope, they become widely dilated and fixed. When they are in this condition, it is interesting to note how quickly they undergo change when the cerebral anæmia is dispelled by lowering the head and raising the limbs, so as to empty the latter of their vascular contents, and thereby replenishing the heart and brain. The pupils then become mobile, less dilated, and may fall to medium size, or even become contracted, according to the amount of blood thrown into the cranium. This is quite in accordance with the observation of B. Séquard, who has shown that when an animal is suspended by the hind legs, contraction of the pupil occurs, comparable to that obtained by ablation of the superior cervical ganglia.

Much the same pupillary phenomena are seen during the action of drugs which affect the cerebro-spinal system, even in those which, in the first instance, produce myosis. In such, if the action of the drug be pushed, a stage is arrived at, when the function of the respiratory and cardiac centres is so seriously compromised that the pupils become widely dilated and fixed. This may be illustrated by the action of three drugs, opium, chloroform, and alcohol. When the physiological effect



of a large dose of opium is fully established, the pupils are in a state of stabile myosis, and continue so as long as the cardiac and respiratory centres are active. When the dose is sufficiently large this stabile myosis is succeeded by a rapid change to that of stabile mydriasis, indicating that the function of the cerebrum and the medulla has been so dangerously interfered with, that it falls practically into abeyance, the cardiac action continuing for a brief period, partly through the inherent ganglionic cardiac centres, the respiration meanwhile being extremely slow, irregular, and gasping. If energetic measures are not promptly adopted, the life of the patient is measured by minutes. This has been verified by frequent instances. Though a most dangerous symptom, it is not absolutely hopeless, as is illustrated by a case of this kind which fell under the writer's observation, in which the patient was restored by means of artificial respiration continued for two consecutive hours (the stomach having previously been duly washed out). At the termination of an hour and a half, when a pause was made in the artificial respiration, in order to test the condition of that function, there was only one gasp, as if the air had just distended the lungs after their artificial compression. The pulse, at the same time, was a mere thread, difficult to perceive. At the end of another quarter of an hour, feeble, shallow respiratory efforts were made by the patient. The artificial breathing was carried on for a further period of fifteen minutes, during which the lividity of the face and surface of the skin cleared away, and after that the patient was able to breathe without further aid. Patient ultimately recovered, and was alive four years afterward. It was interesting to note that after she had recovered partial sensibility, and when she was able to breathe of her own accord, the pupils returned to the condition of myosis from that of mydriasis, in which they had been during the time that artificial respiration had to be continued; or, in other words, they remained dilated until the function of the brain had partially recovered.

This condition of stabile mydriasis setting in so rapidly, and taking the place of the myosis, shows that the opium has no longer the power of asserting its well-known influence on the pupil in the presence of the suspension of the brain function. The change indicates that death is imminent. The mechanism producing contraction of the pupil in these instances may probably be the congestion of the brain and its membranes, as well as the ocular vessels; and the rapid dilatation of the pupil to the anæmia coincident with the suspension of function.

It is probable that statements made in some text-books, regarding the action of opium, as occasionally causing dilatation of the pupils may be explained in this way. When death ensues after opium-poisoning, the pupils first relax somewhat, and then become medium. From this it will be seen, it is quite erroneous to suppose that the pupils will neces-

sarily be found contracted in the cadaver after death from opium-poisoning. In six instances which have come under personal observation, the pupils were found to measure from four to six millimetres after death, although they measured about two millimetres shortly before death. It is right to remember that the apparent congestion of the internal organs in opium-poisoning may, in part, be due to the great fluidity and dark color of the blood.

The coma arising from alcohol, as was pointed out by me in 1879, may be distinguished from that due to other causes by the fact that when the patient is left lying undisturbed for twenty minutes, the pupils are in a state of myosis, pin-head contraction. If an attempt be then made to arouse the patient by shaking him, or pulling his hair, though he still remain quite comatose, his pupils will slowly dilate, until, if the physical irritation be continued, they become fully dilated. If the patient be then left undisturbed, the pupils remain dilated for a period of variable duration—minutes, as a rule, after which they begin to contract, doing so at a very slow rate until they reach their former dimensions. The time taken for the transition from the fully dilated stage to that of pin-head contraction, is from five to ten minutes, varying according to the intensity of the coma. In some rare cases, where the coma is very intense, the change is completed in less than five minutes. In instances in which the patient is not deeply comatose, the dilatation continues for ten minutes, and then contraction sets in at a very sluggish rate. In persons in whom the alcoholic coma is passing off, and who are merely insensible, and who can be temporarily roused, the dilatation of the pupil once established continues, or it may become smaller, though it does not again attain the same degree of contraction it formerly did. These observations have been subsequently verified in many hundreds of cases. In some uncommon instances of cerebral compression, through apoplexy or other cause, the contracted pupil will be slightly enlarged on stimulation (not full dilatation, as in alcohol), and very soon, in most, immediately thereafter, it will contract to its former size.

But when the dose of alcohol is poisonous, and the patient is about to succumb from its effects, the pupils, after being contracted as above, pass rapidly into complete stabile mydriasis. This is a condition which must be very seldom seen as arising from alcohol, but was once observed by the writer, in the case of a man who had half an hour previously drank off at a draught a quart of strong alcohol (proof strength); the pupils becoming widely dilated and fixed, the patient dying fifty minutes afterward. Here the function of the medulla had become interrupted, and finally suspended, just as in opium-poisoning.

In chloroform narcosis, the same pupillary phenomena are observed during the extreme stages. From personal observations, extending over several hundred carefully recorded cases, it is seen that the pupils are in

a very variable state during the preliminary periods, much too variable to permit any rule being formulated regarding them. When, however, reflex action is abolished, except in the cardiac and respiratory centres, the pupils become contracted and fixed. This may be regarded as the safety zone of complete chloroform narcosis. But if the anæsthesia be pushed beyond this stage wide dilatation of the pupils ensues, indicating a suspension of function in the cardiac and respiratory centres. This is a most critical condition, though one by no means necessarily fatal, as by lowering the head and raising the floor of the table, and by promptly carrying out artificial respiration, even while feeble respiratory efforts are being made by the patient, the danger may be, and very frequently has been averted. Given a person free from organic lesion of the nerve centres, heart, or lungs, in whom during chloroform narcosis, stabile mydriasis suddenly occurs as a result of the action of chloroform on the respiratory centres, the patient ought to recover, if artificial respiration coupled with the lowering of the head, be promptly resorted to, and the former efficiently carried out. It is interesting to note in such cases the marked effect produced by elevating the foot of the table, so as suddenly to place the patient's head and thorax at a very low level, the pupils becoming quickly contracted. In this connection, however, it ought to be borne in mind, that one of the earliest indications of a return of reflex action is vomiting, which, as a rule, is accompanied by dilated pupils, the result of cerebral anæmia.

In cases where the functions of the cerebrospinal system, especially of the cardiac and respiratory centres, have already been enfeebled (by organic lesion or otherwise), chloroform acts more powerfully; a few whiffs sufficing to induce complete insensibility, and the administration of an ordinary dose giving rise to an alarming state, which only prompt measures can prevent from becoming fatal. In such cases the pupils very readily pass into wide dilatation with a very small amount of chloroform.

When the function of the brain is suspended by want of oxygenated blood, the pupils are widely dilated and fixed. This may be seen in cases of asphyxia either by poisonous gases or arising from mechanical causes. It was once observed by the writer in two men who had all but succumbed by inhaling coal-gas, emanating from a broken gaspipe in their bedroom; and it is also seen in cases of hanging.

Turning to the effects of pressure exercised upon the brain as a whole, it produces pupillary states varying according to its amount. When it is sufficient to place in abeyance the cerebral function, mydriasis occurs; and when of much less degree, causing only a small area to be involved, it is usually followed by myosis. The following is a typical case, illustrating these points as well as the most carefully planned and skilfully executed experiment could do.



While acting as House Surgeon in the Royal Infirmary, Glasgow, in 1870, the writer had the opportunity of observing the following case:

A well-developed and strongly built man, about twenty-eight years of age, was brought into the Infirmary in an unconscious state, having fallen from a height about an hour previously. There were bruises on his face, nose, and forehead, and there was slight oozing of blood from both nostrils. He was deeply comatose, his breathing was stertorous, his pulse slow and feeble, and the pupils of both eyes were widely dilated and fixed. Urine and feces had been passed involuntarily. This state continued for fully half an hour after admission, during which his pulse became so feeble, as sometimes to be scarcely perceptible; his breathing was even more deeply stertorous, and it was accompanied by lividity of the face. At the expiration of this period, a sudden gush of blood from both nostrils poured forth as a torrent, causing wide distention of the nasal alæ. This continued for full two minutes, then quickly lessened in quantity, becoming a mere trickling, which lasted half an hour. The pupils, which had been widely dilated and fixed from the time of his admission into the hospital up to the very moment when the blood began to escape in such volumes from both nostrils, were found at the expiration of two minutes, during which it flowed, to have become medium, to be quite active, readily contracting when exposed to light, and quickly dilating when shaded. Along with this, the lividity of the face disappeared, the breathing became free, though the pulse was extremely weak, and the patient pale. He however soon recovered consciousness, answered a number of questions correctly, and expressed surprise at finding himself in the infirmary. He also remembered, and was able to describe some of the circumstances connected with the accident which caused his injuries. This stage lasted two hours, the pulse and color of the face steadily improved, and during the whole time the pupils were active and normal. Half an hour later, the pupils began to be sluggish and contracted. Three hours after the hemorrhage they were very sluggish and contracted. Four hours later, they did not respond to light, though they were not so contracted as they had been half an hour previously. Patient no longer answered questions, but still was sensible to external impressions, especially of a painful kind. Six hours after the hemorrhage the patient was deeply comatose, and otherwise much in the same condition as when admitted, his pupils having again become widely dilated and fixed. Ten hours subsequently to the hemorrhage (ten and a half hours from admission) breathing became very labored, the lividity of the face marked, pulse flickering, and death ensued about twelve hours and twenty minutes after the hemorrhage from the nose.

The post-mortem examination showed that the cribriform plate of the ethmoid was extensively fractured, the aperture between the fractured bones being filled with clot; the crista gallæ was driven upward, the anterior part of the longitudinal sinus was ruptured, and a clot of blood existed between the dura mater and the skull, filling the greater part of the anterior fossæ, and pushing backward the brain. Both frontal lobes were much compressed, the convolutions were flattened, and the brain tissue comprising them was somewhat softened. The brain, as a whole, bore evidence of compression, but it was otherwise healthy. With the exception of a fracture of both bones of the leg, there were no other injuries.

REMARKS.—This case may be divided into four periods, each being accompanied by a peculiar pupillary condition. First, there was a period of severe intracranial pressure, indicated by symptoms of cerebral compression, in which the brain function was for the most part suspended. The pupils at this stage were widely dilated and fixed. This condition was present at the time of patient's admission, and half an hour afterward ended abruptly on the escape of blood from the interior of the skull. Second, with the relief of the intracranial pressure, the indications of compression of the brain disappeared, its functions returned, the patient regaining consciousness. The pupils then became normal, responding actively to the alternate action of light and shade. This state was the immediate sequence of the relief of the pressure on the brain by the escape of the pent-up blood, and it continued for two hours, until after the period of reaction had set in. Third, there was a period of slight cerebral pressure, due to the recurrence of hemorrhage within the skull, occurring shortly after reaction had set in. This was the direct result of the reaccumulation of blood within the skull, and the consequent pressure on the brain, a clot having filled the aperture in the fractured ethmoid. The patient in this stage had become drowsy. The pupils gradually lost their activity, becoming very sluggish and somewhat later contracted. This period lasted about four or five hours. It corresponded to slight cerebral pressure. Fourth, a stage of severe intracranial pressure ensued, marked by all the symptoms of cerebral compression and accompanied by widely dilated and fixed pupils. This lasted about four and a half hours, ending in death. This corresponded to the first stage on admission, the function of the brain having again become suspended. In a tabulated form it would appear thus:

<i>Pressure.</i>	<i>Action on Brain.</i>	<i>Effect on Pupil.</i>
1. Very severe.	Function almost in abeyance.	Stabile mydriasis.
2. Removal of pressure.	Restoration of function.	Normal and active.
3. Slight.	Interruption of function.	Contracted and sluggish.
4. Very severe.	Suspension of function, ending in its abolition.	Stabile mydriasis.

The same pupillary phenomena arising from pressure, induced by a pathological cause, are illustrated by a case of tubercular meningitis with its accompanying effusion, which is given elsewhere in detail. On admission, the patient, who was insensible, gave vent to the peculiar "hydrocephalic cry." She could move her limbs freely, her pupils were in a state of myosis (stabile). At this stage, it was probable that she suffered from interference with cerebral function, caused by effusion of fluid exercising a degree of pressure on the brain. A few days subse-

quently, she became unconscious, pulse very feeble, respiration labored and shallow accompanied by great lividity of the face, and a markedly subnormal temperature. The pupils were then in a state of stabile mydriasis. It was diagnosticated that the fluid had further increased, and was now exercising very severe pressure on the brain, placing its function in abeyance, with the exception, perhaps, of the respiratory and cardiac centres, which, though seriously interfered with, were still able to act to a slight extent. To relieve this pressure, a puncture was made through the brain membranes, when a large quantity of cerebrospinal fluid escaped in a jet. While the fluid flowed away, the respirations improved, the cardiac impulse increased in strength, the lividity disappeared, the pupils became much smaller, and shortly afterward became normal in size and sensitive to light, though they were somewhat sluggish. This condition continued for twenty-four hours, the temperature increasing from subnormal to 102.8° F. Ultimately the patient died.

The condition may be thus formulated:

<i>Pressure.</i>	<i>Action on Brain.</i>	<i>Effect on Pupil.</i>
1. Slight.	Interference with function.	Myosis.
2. Severe.	Function in abeyance.	Stabile mydriasis.
3. Removal of pressure.	Function nearly quite restored.	Mobile and almost normal.

*Twelve cases of obliteration of function from pressure and bruising of the brain.* Numerous instances of severe injury to the cranial contents have been observed by the writer in which both pupils were widely dilated and fixed; post-mortem examination afterward showing extensive destruction of the cerebral substance. In twelve such cases the patients died within a few hours after the accident. The post-mortem in these showed, besides serious injury of the skull, that both cerebral hemispheres had been encroached upon by extensive extravasations of blood, or by portions of bone or foreign matter driven into the cerebral substance, exercising severe and general pressure and producing extensive laceration of the brain. In all of them there was destruction of both hemispheres, sufficient to obliterate function.

*Four cases of extensive bruising and laceration of the brain without pressure.* Besides these, there were four cases in which a sufficient hiatus had been formed in the osseous walls of the skull to prevent the possibility of pressure being exercised on the hemispheres, and yet the pupils were dilated; the extensive laceration and severe bruising of the brain having destroyed the function of the part. Nor is the widely dilated and fixed pupils arising from cerebral pressure limited to surface lesions, or such as are caused by traumatism. In cases of extensive



hemorrhage from the basal or deep cerebral arteries, causing great pressure or laceration of the brain, widely dilated and fixed pupils are seen, and they are accompanied by abolition of cerebral function. In one instance of this kind which came under personal observation, the lateral ventricles had become greatly distended with blood, the coma was profound, and both pupils were in a state of stabile mydriasis, this being the usual condition of the pupils in such lesions. In another instance, a large cerebral abscess had burst into the ventricles and this was notified by the sudden accession of deep coma, accompanied by widely dilated and fixed pupils. These phenomena are in accordance with those observed by others, who have pointed out that congestion of the membranes and slight hemorrhage into the ventricles is accompanied by contraction of the pupils, while profuse hemorrhage into the ventricles produces dilatation of the pupils. In the latter case, it is supposed that the result ensues from compression of the common motors, but the pressure no doubt causes suspension of function of the brain as a whole.<sup>1</sup>

It is true that cerebellar hemorrhage is generally indicated by contracted pupils, but this is not always so. When the pupils are contracted the extravasation is slight, but when the outpouring of blood is much greater, then dilatation ensues. It is not often that dilatation is seen from hemorrhage into this seat, on account of the great importance of the structures in the immediate vicinity, a comparatively small lesion producing a fatal result.

*Both pupils dilated and fixed from very large unilateral lesions.* In other instances both pupils were dilated and fixed, the lesion being unilateral, though indirectly the opposite side of the brain was implicated. Six cases of this kind were observed. All of them had sustained fracture through the middle fossa with rupture of the middle meningeal artery or one of its branches, from which extensive unilateral extravasation of blood had taken place. In a general way, these fractures may be described as extending from the base to above the level of the parietal protuberance, and the extravasated blood from the base of the anterior fossa to the posterior part of the middle fossa. The pressure was greatest opposite the middle lobe, the prominences of the convolutions being there effaced, and the outer wall of the lateral ventricles being flattened. In at least three of these the opposite hemisphere was involved directly by the pressure which was communicated through the falx cerebri, a slight concavity on the inner side of the opposite cerebrum indicating the seat of pressure. The opposite hemisphere, from the one flattened by direct contact with the blood clot, would likewise have been affected by the increased amount of cerebro-spinal fluid displaced by the blood clot from the other hemisphere, though the pressure from this

<sup>1</sup> M. Jordan states that "dilatation and total immobility of the pupils on the approach of a lighted candle is one proof of great engorgement of the brain in apoplexy." Dict. des Sc. Méd., 1878.

cause could not be great, distributed as it would be over the whole cerebro-spinal axis. In these instances the patients survived the injury by only a few hours, during which they were plunged in profound coma, and therefore it is possible that the dilatation of the pupil on the side opposite the lesion might have resulted from suppression of brain function (concussion) on that side; though it is probable that the pressure communicated from the lesion in itself exercised a powerful action. It is further possible that the ablation of function by pressure of the white fibres of the centre of the hemisphere would in itself have produced the paralytic mydriasis of the opposite side, though this is much more prone to occur when the blood is extravasated into the interior of the brain.

*One pupil dilated and fixed, the other contracted, accompanied by lesions on both hemispheres.* A few instances occurred in which, with lesions on both sides of the brain, one pupil was in a state of extreme dilatation with fixity, the other was contracted and fixed. In the first instance of this kind, there was a clot weighing not quite half an ounce on the external surface of the dura mater, over the right hemisphere, opposite the anterior ascending convolution, while there was extensive laceration of the middle lobe of the left hemisphere, with its accompanying extravasation of blood. The patient was insensible, and lived for eighteen hours. The left pupil was widely dilated and fixed, the right was contracted and fixed. The function of the left hemisphere had been abolished, while that of the right had only been partially interfered with. In the second instance there was slight laceration of the cortical substance, principally on the base of the first and second left frontal convolutions, with its accompanying extravasation; while on the right side there was an extensive blood clot which filled the subdural space, the dura mater having been ruptured by a spiculum of bone which had penetrated a branch of the middle meningeal. The patient was insensible, surviving the accident by only four hours. During life the right pupil was dilated, and the left was contracted, both being fixed. In the third case there was an extra-dural clot of blood weighing three ounces, situated principally over the outer portion of the left middle fossa; while on the right side, at the junction of the parietal with the occipital bone, near the vertex, there was a small depressed fracture, an osseous spiculum having penetrated the dura mater. This patient was insensible, and lived about forty-eight hours afterward. He had other bodily injuries of a severe kind, which, however, did not exercise any material effect on the brain-function. The right pupil was slightly contracted and very sluggish, while the left was dilated and fixed. In the fourth, there was a very thin diffuse layer of blood spread over the surface of the pia mater covering the convolutions in the anterior portion of the middle lobe of the left hemisphere; while on the right hemisphere there was an extensive laceration and extravasation into its middle and posterior lobes.

Patient lived a few hours after the accident, during which he was insensible. The right pupil was dilated and fixed, while the left was slightly contracted and sluggish. Some would ascribe these results to irritation and paralysis respectively of the oculomotor; while others would look upon them as due to vascular changes in connection with the cerebral lesions.

*One pupil dilated and fixed, the other normal.* Many instances have been observed of dilatation and fixity of one pupil, while its fellow, perhaps with the exception of a little sluggishness of movement, remained normal. These were all cases of fracture of the middle fossa of the skull, and in comparatively few of them was the diagnosis verified by post-mortem examination, though little doubt could exist as to the lesion when accompanied, as they were, by the usual phenomena of hemorrhage from the ear, followed by discharge of cerebro-spinal fluid, ptosis, occasionally external strabismus, facial hemiplegia, and paralysis of members. In such the patient was generally insensible at the outset when both pupils were dilated and fixed. As the patient recovered consciousness, one pupil became normal while the other remained dilated and fixed, this being on the side of the lesion. In some of these the visual power on the same side as the dilated pupil was in abeyance; in others, it was imperfect, and in a few it was almost normal. The pressure exercised by the blood-clot must have been sufficiently great to place in abeyance the function of the greater part of the affected hemisphere, as evidenced by the complete paralysis of the opposite member, the interference with vision, and the evident effect upon the third nerve. In those cases in which post-mortem examinations were obtained, the basal fracture was continued into or toward the vertex, and the clot in most instances occupied the whole of the middle fossa from the petrous portion of the temporal to the vertex, the convolutions, especially the ascending, being considerably compressed. The opposite hemisphere was in almost a normal condition. In those that recovered, the dilatation gave way slowly, and was followed by a degree of contraction along with sluggishness of movement which ultimately passed off; though in one case it still remained small and sluggish at the termination of the fifth month from the date of the accident. These changes were evidently determined by the gradual absorption of the blood-clot. It is more than likely that in most of them the third as well as the seventh nerve was paralyzed, and in one or two instances the fifth in addition, as indicated by the loss of sensation on the affected side. Occasionally the second was interfered with. Hearing was generally much affected, if not absolutely in abeyance on the affected side, during the early months, mechanical obstruction by blood-clot producing loss of hearing as well as interference with the nerve.

*Pupil contracted on only one side.* Quite a number of cases have been



observed by the writer in which, while one pupil was normal, its fellow was contracted and fixed, and where, judging from other symptoms, a cerebral cortical lesion was diagnosticated as existing on the same side as the affected pupil. In at least three of these instances the diagnosis was verified by demonstration of the lesion on the operating table, and by the fact that its removal was followed either by great amelioration of the state of contraction, or by its complete relief. One was a case of fibrous tumor of the dura mater, situated over the left anterior lobe, which exercised pressure on the surface of the first and second frontal convolutions. The pupil on the same side as the lesion was minutely contracted and fixed. Operation was demanded for epileptoid seizures. The tumor was removed, and the patient recovered. The activity of the pupil very soon returned, and the contraction was in great measure removed within a few days subsequent to the operation. Ultimately the two pupils acted alike. The second was a case in which there was a cortical extravasation of blood from a bruise of the ascending frontal convolution, and which was surrounded by an area of irritation. The pupil on the same side was contracted and fixed. The lesion was removed by operation. The patient recovered, and the contraction, though at first remaining to a slight extent, disappeared completely within a month. In the third instance, the dura mater over the right frontal region was punctured by an osseous spiculum. The pupil of the corresponding side was minutely contracted. On the removal of the fragment of bone, and the escape of a small quantity of fluid blood from under the dura mater, the contraction of the pupillary sphincter relaxed immediately. Four hours afterward the pupil responded slowly to alternate light and shade. Two days after operation it was quite normal. There are many explanations advanced for such pupillary effects arising from these lesions. The influence of the dura mater on the basal nerves has to be borne in mind, especially when it is inflamed; also that of the possible effect which might be transmitted through the fibres of origin of the optic to its centre, and so to the third nerve; and, again, the effects of irritation arising from pressure exercised on the two alleged centres of pupillary movement in the cerebral cortex. All of them could, however, be more directly explained by vascular changes accompanying these lesions producing their effects upon the vessels of the eyeball.

It is interesting to note that in cerebral softening the action is like that of hemorrhage into the brain, producing abolition of function and dilatation of the pupil. In some such cases there is no doubt that the oculomotor nerve has also lost its power, as indicated by the loss of ocular movement; but in others the movements are retained, the pupil, however, being dilated.

*The effects of spinal lesions on the pupil.* There have been very many instances under personal observation of spinal irritation inducing labile

mydriasis, and there have been a few of complete lesion of the cord causing stabile myosis. Of the latter, one occurred in a man of fifty years, the subject of a sarcoma involving the bodies of the lower cervical vertebræ pressing upon the spinal cord and ultimately crushing it. The pupils were about two millimetres in diameter, and fixed. The vessels of the head and face were dilated, and the conjunctivæ were suffused. One was a child, aged five years, affected with tubercular infiltration and destruction of the bodies of the third, fourth, and fifth cervical vertebræ, opening up the canal and exposing its contents. An abscess formed, which involved a limited area of the spinal canal opposite the affected vertebræ. The anterior portion of the theca was represented by a fungated process of granulation tissue; the cord was in a much softened condition, and was surrounded with pus. The pupils, which for months had been in a state of labile mydriasis, became, during some days prior to death, contracted to two and a half millimetres in diameter. Several traumatic lesions of the cord in the upper dorsal and lower cervical vertebræ have been observed, accompanied by myosis, the contraction being from two to three millimetres. In each of those death ensued within some hours or days from date of injury. In all there was destruction of the cord at the seat of injury; in some, to the extent of severance of almost its entire calibre.

In the foregoing there is sufficient evidence to show that the suspension or abolition of cerebral function in the living body is attended by mydriasis, the latter being the sequent of the former. If inquiry be made concerning the mechanism inducing this pupillary effect coincident with the arrest of cerebral function, the theory which explains the greater part, if not the whole of the phenomena, is that which has been so ably advocated by Mosso. The passive movements of the pupil are regulated by the vascular system of the iris, which is in complete harmony with that of the encephalon. In those conditions inducing general suspension of the cerebral function, a state of ischemia prevails in the brain and iris inducing mydriasis. This, likewise, obtains in unilateral lesions, where the pressure is so great as to induce anæmia of brain and iris. Myosis may also be brought about by a like mechanism acting in the opposite direction. The "irritation" setting up congestion of the cerebral and meningeal vessels, leads to congestion of the vessels of the iris, and so produces contraction of the pupil.

When investigating the cause of a given pupillary state, this should be done in a methodical manner, examining the various sources controlling pupillary movements, and eliminating those which do not apply. The examination ought to be conducted by answering, *seriatim*, the following questions:

1st. Is the pupillary condition due to the local or constitutional action of any drug?

2d. Is the state of the pupil dependent upon any local ocular lesion or optical defect (including artificial eyes)?

3d. Is it due to any spinal or sympathetic lesion, more especially of the cilio-spinal region and the cervical sympathetic?

4th. Is it dependent upon any localized cerebral lesion affecting special brain centres—*i. e.*, corpora quadrigemina, optic thalamus, or the origin and intracranial course of the second, third, and fifth nerves, especially the third?

5th. If due to none of the above, the probability is that it depends upon either a suspension of brain function or to some cerebral "irritation," in either case inducing vascular changes in the encephalon and iris.

The following points, among others, may be formulated from the foregoing:

(A) 1. When the function of the brain is in abeyance, the pupils are in a state of stabile mydriasis.

2. This may arise either from temporary suspension or from abolition of function.

3. Temporary suspension is illustrated by shock, and the effect of some poisons; while the abolition of function is exemplified by extensive laceration and compression of the brain.

(B) 4. When the function of the brain is interfered with by conditions usually included under the term "irritation," the pupils are in a state of myosis; sometimes labile, but generally stabile myosis.

5. This "irritation" or interruption of function may be seen during certain degrees of cerebral anæmia, produced experimentally, and not as a pathological result; certain amounts of brain pressure, and certain stages of intracranial inflammation.

6. These are illustrated in persons who have suddenly lost a considerable quantity of blood (about a fifth of the whole); in the growth of intracranial tumors and the formation of sanguinolent serous and purulent effusions, when the degree of pressure may be denominated as "medium," and at certain periods of meningitis and encephalitis.

(C) 7. The same pathological factors which cause myosis may also cause mydriasis, the degree in which these factors are present being the determining point between the former and the latter, and not *merely* the particular locus in the brain.

8. It is well illustrated by cases where the hemorrhage is repeated, and is finally pushed to syncope; in intracranial pressure, which is gradually increased until it becomes great, such as arises from tumors, blood clots, and inflammatory products.

(D) 9. When the function of one-half of the cerebrum is placed in abeyance by a superficial or cortical lesion, the pupil on the same side as the lesion is in a state of stabile mydriasis.



10. This is well illustrated in cases of intracranial sanguinolent effusion consequent on injury (see list of cases).

(E) 11. When the function of one-half of the cerebrum is interfered with by some source of cortical irritation, the pupil on the corresponding side to the lesion is in a state of myosis.

12. This is illustrated by traumatic and pathological lesions affecting the cortex of the cerebrum (see list of cases).

(F) 13. Hemorrhage into the pons Varolii when small, causes strongly contracted pupils; but when it is more extensive, involving the gray matter beneath the aqueduct of Sylvius, a state of stabile mydriasis is induced.

14. Effusions into the lateral ventricles when small, produce contraction of the pupils, but when the effusion is great stabile mydriasis ensues.

15. Inequality of the pupils indicates a unilateral lesion or lesions.

16. When the lesion is cortical and unilateral the pupillary manifestations are on the corresponding side. When the basal nerves are affected unilaterally the pupillary effect is manifested on the same side as the lesion. When the lesion is unilateral and affects the function of the white fibres of the cerebrum the opposite pupil is generally affected. When the basal ganglia are implicated unilaterally the pupil is sometimes affected on the same side as the lesion, occasionally on the other side.

In a case of cholesteatoma and in another of glioma of the right optic thalamus, dilatation of the left pupil was found (*Ross*, vol. ii. p. 572).

In lesions of the cerebral peduncles the pupil is affected on the same side as the lesion.

Lesions in the corpora quadrigemina affect both pupils, irritation<sup>1</sup> causing contraction, destruction causing dilatation and immobility.

Section or destruction of one optic tract, causes dilatation of the opposite pupil and blindness of the opposite eye.

17. Irritation of the cord, especially the cilio-spinal axis, produces dilatation of the pupils, while destruction of the cord causes contraction. These effects are generally seen in both pupils, though, experimentally at least, they may be confined to the same side as the lesion.

18. The pupils are affected in the same way by lesions of the sympathetic, though in unilateral lesions it is only the pupil on the same side as the lesion which is affected.

19. Speaking generally, when myosis is due to a cerebral cause, it indicates the earlier stages of various affections; when due to a spinal

<sup>1</sup> Unilateral electrical stimulation causes dilatation of both pupils, the opposite one becoming first dilated. Ferrier explains this as the result of irritation of a sensory structure, in this case acting through the medium of the anterior roots of the second dorsal nerves which ascend in the cervical sympathetic.

lesion, it points to a most serious paralysis, often to the destruction of the part. When mydriasis arises from a cerebral lesion it is generally present in large amount; when due to a spinal affection it indicates irritation of the part.

MYOSIS OCCURS UNDER THE FOLLOWING CONDITIONS:

1. When a bright light acts upon the retina.
2. Accommodation for a near object.
3. Rotation of the eyeball inward.
4. Local irritation or painful affections of the eyeball.
5. Irritation of the oculomotor nerve.
6. Paralysis of sympathetic roots of lenticular ganglion or trunk of sympathetic in the neck. In paralysis of the fifth there is myosis and inflammation passing on to destruction of the eyeball.
7. Paralysis of the ciliospinal region of spinal cord. All affections which destroy the cervical spinal marrow and intercept its conductivity produce congestion of the face and contraction of the pupils. In neurosis, which suspends or diminishes the tone of the sympathetic or spinal axis.
8. Encephalic congestion, such as: obstacle to return of blood in jugulars; venous congestion due to cardiac causes; active hyperæmia, plethora, fevers, pneumonia, hepatitis, etc.; when animal is suspended by the heels; in early stages of meningitis and encephalitis; in acute mania with marked activity of the cerebral circulation; in chronic mania pupils are variable, when contracted are said to indicate super-vention of paralytic dementia.
9. During sleep; some believe this to be due to the congestion of the cerebral vessels and those of the iris (Mosso); others, to the inward rotation of the eyeball.
10. In the early stages of cerebral tumor.
11. In small hemorrhages into the cerebellum. In irritation of the cerebellum, contraction of the pupil on same side as lesion ensues.
12. Electrical stimulation of the angular gyrus frequently causes contraction of the pupil.
13. During forced expiration, when the eye is at the same time passive. Also generally seen during the period of apnoea in Cheyne-Stokes respiration.
14. Convulsions arising from meningo-encephalitis are said to be accompanied by myosis, while in convulsions due to epilepsy and in epileptiform fits they are usually accompanied by mydriasis.
15. When the eye contracts on accommodation to a near object, yet does not contract to light, this indicates a lesion situated between the corpora quadrigemina and the oculomotorius. This affection is known as the Argyle-Robertson symptom. It is seen in locomotor ataxia and occurs in the progressive paralysis of the insane.
16. During uræmic coma.

17. Myotics: physostigmine, nicotine, pilocarpine, morphine, muscarine.

MYDRIASIS OCCURS UNDER THE FOLLOWING CONDITIONS:

1. In darkness or in subdued light.
2. Accommodation for distant objects.
3. Rotation of the eyeball outward.
4. In forced movements discharged from the medulla: vomiting, swallowing, chewing, forced respiration.
5. Paralysis of the oculomotor (accompanied or not by immobility of eyeball, external strabismus, diplopia, etc.).
6. Destruction of the optic: amaurosis. When unilateral, associated movements continue.
7. Irritation of sympathetic: powerful impressions on sensory nerves; strong moral emotions, mental pain, grief, fear; neuralgia of the fifth nerve.

8. Irritation of the spinal cord, especially ciliospinal region.

9. Encephalic anæmia: In all cases where there is reflex contraction of the vessels of the head; when loss of blood from the body is excessive; obstruction of the carotid arteries; in thrombosis of brain sinuses; dilatation of mesenteric vessels when extreme; syncope, intense cold, rigors; dyscrasias of the blood, convalescence, cachectic conditions; asphyxia, epilepsy, in certain stages of these affections.

10. Pressure of cerebrum when great in amount, as from hemorrhage, neoplasms, etc. In the last stages of meningo-encephalitis.

11. In cerebral softening. In acute dementia (œdema of cortex cerebri) observers state that the pupils are invariably dilated (Hutchinson).

12. In idiots the pupils are generally dilated.

13. During deep inspiration, generally in respiratory period of Cheyne-Stokes breathing.

14. Hemorrhage into centrum ovale and into cerebral peduncles.

15. Ferrier produced dilatation of opposite pupil by destructive lesion of the optic tract in the thalamus, indicative of rupture of the centripetal fibres to the irido-motor nucleus in the floor of the Sylvian aqueduct.

16. In hydrophobia there is mydriasis.

17. Mydriatics: atropine, homatropine, duboisine, daturine, hyoscyamine. Curare injected subcutaneously in animals (five to ten centigrammes) induces in one or two hours complete paralysis of the third nerve.

THE EFFECT ON THE PUPIL OF LOCAL CONDITIONS OF THE EYEBALL:<sup>1</sup>

1. Hyperæmia of the iris produces contraction of the pupil which darkness scarcely diminishes.

<sup>1</sup> The writer is indebted to Dr. Thomas Reid for revising this list of pupillary effects occasioned by local conditions of the eyeball.



2. Presbyopia and hypermetropia cause contraction of the pupils in cases where continuous and excessive strain for near accommodation has been long continued and has produced asthenopia.

3. Pupillary atresia, consequent upon chronic irritation with posterior synechia, producing contraction of the pupil.

4. In synechia total dilatation is impossible, the iris only dilating where free, hence, the pupil is irregular. If the synechia is annular the pupil is both contracted and immobile.

5. In microria there is a congenital state of extreme contraction.

6. In glaucoma the pupil is dilated, contracting little or not at all to the action of calabar bean.

7. In coloboma, both in the congenital form and after iridectomy, there are irregularity and immobility of the pupil.

8. In idiopathic mydriasis there is little contraction to the action of light or to myotics.

9. In certain cases of amblyopia and amaurosis there is dilatation of the pupil.

10. In hippus pupillæ there are alternate contraction and dilatation often accompanied by nystagmus.

11. Inequality of the pupils exists in some who have different degrees of refraction in the two eyes, one being emmetropic and the other myopic.

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## THE THERMAL DEATH-POINT OF PATHOGENIC ORGANISMS.

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AN exact knowledge of the thermal death-point of pathogenic organisms is desirable, both as a matter of general scientific interest, and from a practical point of view. As biologists, we wish to know whether the vital properties of the living protoplasm contained in the minute vegetable organisms in question are destroyed at a uniform temperature, and if so at what temperature; or whether there is a considerable range in the limits of vital resistance to heat exhibited by different organisms of this class. As sanitarians, we wish to know what temperature can be relied upon for the destruction of disease germs in the excreta of patients suffering from typhoid fever, from cholera, and from other infectious diseases transmitted by means of the alvine discharges of the sick; whether boiling of infected clothing, or of drinking water contaminated with disease germs, is a safe means of disinfection, etc.

Various experimenters have recorded observations with reference to the thermal death-point of different microorganisms, but, so far as I

know, no one has heretofore made an extended inquiry, by means of a uniform method, with a view to determining the vital resistance to heat of the considerable number of pathogenic organisms now known to bacteriologists.

All of the experiments recorded in the present paper relate to *moist heat*—that is to say, the test-organisms have in every case been in a moist condition, in fluid cultures. The effect of dry heat upon desiccated organisms is quite another question. This has been studied by Koch and Wolffhügel,<sup>1</sup> who have summarized the results of their experimental work as follows:

“1. A temperature of 100° C. (212° F.), maintained for one hour and a half, will destroy bacteria which do not contain spores.

“2. Spores of mould-fungi require for their destruction in hot air a temperature of from 110°–115° C. (230–239° F.), maintained for one hour and a half.

“3. Bacillus spores require for their destruction in hot air a temperature of 140° C. (284° F.), maintained for three hours.” (Op. cit., p. 231.)

In my experiments I have adopted ten minutes as the standard time of exposure to a given degree of temperature.

A fresh culture of the organism to be tested is introduced into capillary glass tubes which have an expanded extremity to serve as an air chamber, by means of which the culture fluid is drawn into or forced out of the capillary tube. This is readily accomplished by heating the little bulb.

The glass tubes, hermetically sealed, are introduced into a vessel containing water, which is kept at a uniform temperature by personal supervision, a Bunsen burner being the source of heat. A standard thermometer is placed in the vessel, and this and the capillary tubes are protected from the bottom of the vessel containing them by a thick plate of glass. A uniform temperature throughout the fluid is maintained by stirring it with a glass rod.

After exposure for ten minutes to a given temperature the sealed extremity of the capillary tube is broken off with sterilized forceps, and the contents are forced, by heating the air in the expanded extremity, into a test-tube containing sterile flesh-peptone-gelatine, which has been liquefied by exposure in a water bath to a temperature of 40° C., or below. The cotton plug is only removed for a moment in order to introduce the contents of the capillary tube, and in my extended experiments I have very rarely seen any accidental contamination. A rubber cap is next placed upon the open end of the test-tube and the gelatine is spread in a uniform manner over the interior of the tube by the method of Esmarch.<sup>2</sup> This is accomplished by rolling the tube in iced water until the gelatine hardens.

<sup>1</sup> Mitth. a. d. kais. Gesundheitsamte, Bd. 1.

<sup>2</sup> Zeitschrift für Hygiene, Bd. 1, Heft 2, S. 293

These tubes are then kept at a temperature a little below the melting point of gelatine— $20^{\circ}$  to  $22^{\circ}$  C.—for at least a week. If the test organism has not been killed by the temperature to which it was exposed colonies are developed in the gelatine, which may often be recognized by the naked eye within a day or two. In other cases development is retarded, and it is only at the end of four or five days that evidence of growth is seen. The absence of growth at the end of eight or ten days is taken as evidence that the vitality of the test-organism has been destroyed by the temperature to which it was exposed. In every case a control experiment is made with material from the same culture which has not been subjected to heat.

**BACILLUS OF TYPHOID FEVER.**—Since the publication of Gaffky's memoir, in the second volume of the *Mittheilungen aus dem Kaiserlichen Gesundheitsamte*, his statements with reference to the formation of spores by the typhoid bacillus have been generally accepted, and have been confirmed by most of the observers who have followed him. Seitz,<sup>1</sup> however, has not been able to convince himself of the presence of spores in his cultures. Buchner<sup>2</sup> and Michael<sup>3</sup> also report their failure to find spores.

Gaffky states that spores are not formed at the room temperature, but that they are developed on the third or fourth day in cultures kept in an incubating oven at  $37^{\circ}$  C. These spores are said to be shining, round bodies, which occupy the whole width of the bacilli and are situated only at the ends of the rods. A single rod is said to contain but one well-developed spore, although, according to Gaffky, an imperfectly developed spore may sometimes be seen at the opposite end of a rod containing a perfect spore.

My cultures of the typhoid bacillus are from stock brought from Koch's laboratory by Dr. Meade Bolton. The morphological characters and the characteristic growth upon potato correspond perfectly with the account given by Gaffky and other authorities, and leave no doubt as to the identity of the organism which has served for my experiments. I have repeatedly seen in my potato-cultures which had been kept at  $38^{\circ}$  for several days, shining, spherical bodies, located at the ends of the rods, which appear to be spores, and which I suppose to be identical with the bodies pronounced by Gaffky to be spores. But these bodies stain with fuchsin, and if they are in truth reproductive elements, my temperature experiments show that their vitality is destroyed by a temperature of  $60^{\circ}$  C.

As my own previous experiments upon spore-bearing bacilli, and those of other experimenters, indicated that spores require for their destruction a comparatively high temperature, I made first the following ex-

<sup>1</sup> Bakteriologische Studien zur Typhus—Aetiologie, München, 1886.

<sup>2</sup> Archiv f. Hygiene, vol. iii. p. 361.

<sup>3</sup> Fortschr. d. Medicin, 1886, No. 11.



periments, in which material from a pure culture in veal broth was exposed for the time adopted as a standard (ten minutes), as follows:

*Nov. 10.* 50°, 60°, 70°, **Cont.**

In this, and in all subsequent records of experiments made, the figures in heavy type indicate that growth occurred; the figures in light type indicate the absence of growth—*i. e.*, the killing of the test organism by ten minutes' exposure to the temperature indicated by the figures. It will be seen that at 60° and at 70° C. no growth occurred, while in the control tube and in that at 50° (=122° Fahr.) the typhoid bacillus grew abundantly. My object has been to determine the lowest temperature which will insure the destruction of *all* germs of each species tested. I have not therefore considered it necessary to count the number of colonies which have grown out in the Esmarch tubes in those cases where the temperature has been insufficient to accomplish the object in view. Such a record has no special advantage over the simple record of growth or failure to grow. In the practical application of data of this kind to the disinfection of typhoid excreta, etc., it is evident that a few colonies, representing a few bacilli or spores, which have survived the temperature tested, are as potent for mischief as a larger number. My experiments upon the typhoid bacillus are recorded in the following table:

#### TYPHOID BACILLUS.

(Ten minutes' exposure.)

Date.	Culture medium.	Experiments.	Remarks.
1886.			
Nov. 10.	Veal broth.	50°, 60, 70, <b>Cont.</b>	In oven at 38° for 48 hours.
Nov. 15.	Veal broth.	50°, 52, 54, 56, 58, 60, <b>Cont.</b>	Fluid culture of November 1st.
Nov. 30.	Potato culture,	50°, 55, 60. 70, 80, <b>Cont.</b>	Culture at room temperature.
Dec. 4.	Potato culture,	60°, <b>Cont.</b>	Culture in oven at 38° for 7 days.
Dec. 24.	Potato culture,	60°, 70, 80, <b>Cont.</b>	Culture in oven for 10 days, then kept at room temperature for 15 days.
1887.			
Jan. 15.	Potato culture,	55°, 60, 70, 80, <b>Cont.</b>	Culture in oven at 38° for 7 days.
Jan. 20.	Potato culture,	48°, 50, 52, 60, <b>Cont.</b>	In oven at 38° for 10 days.
Jan. 21.	Potato culture,	50°, 60, <b>Cont.</b>	Potato in oven 7 days, then kept at room temperature 7 days.

An inspection of this table shows that no development occurred in any instance after exposure to a temperature of 56° C. and above. In one experiment (Nov. 30) growth occurred after exposure to 55° C., but in this case it was very much delayed; in the experiment of January 15, no development occurred after exposure to 55°. Differences of this kind when we are on the border-line are to be expected.

We may then safely say that the thermal death-point of the typhoid bacillus is 56° C. (= 132.8° F.).

SPIRILLUM OF ASIATIC CHOLERA ("COMMA-BACILLUS" OF KOCH).—My experiments have been made simultaneously upon the cholera spirillum and the two organisms which most closely resemble it, viz., the "cheese spirillum" of Deneke and the Finkler-Prior spirillum.

The cultures in these experiments were all made at the room temperature in flesh-peptone-gelatine.

When development was retarded, the fact is indicated in the tables by a star following the figures denoting the temperature.

Date.	Organism.	Temperature to which exposed ten minutes.
December 30, 1886 . . . . .	Cholera spirillum.	42°, 44, 46, 48*, Cont.
	Cheese spirillum.	42°, 44, 46, 48*, Cont.
	Finkler-Prior spirillum.	42°, 44, 46, 48*, Cont.

In this first experiment no growth was observed in the Esmarch tubes containing the three organisms, after exposure to 48° for ten minutes, for several days after the control tubes had "broken down," but subsequently a few colonies developed in each of these tubes. This considerable retardation of growth led me to think that a slightly longer exposure would be fatal to all of these sprilla. I accordingly made the following experiment at the same temperature, but varying the time of exposure.

Date.	Organism.	Temperature.	Time of exposure in minutes.
January 7, 1887	Cholera spirillum.	48° C. = 118.4° F.	2°, 4, 6, 8*, 10*, 12*.
	Cheese spirillum.	" " "	2°, 4, 6, 8*, 10*, 12*.
	Finkler-Prior spirillum.	" " "	2°, 4, 6, 8*, 10*, 12*.

This was followed by a similar experiment at 50° C.

Date.	Organism.	Temperature.	Time of exposure in minutes.
January 10, 1887	Cholera spirillum.	50° C. = 122° F.	2°, 4, 6, 8*, 10*, Cont.
	Cheese spirillum.	" " "	2°, 4, 6, 8*, 10*, Cont.
	Finkler-Prior spirillum.	" " "	2°, 4, 6*, 8, 10, Cont.

In this experiment only a few colonies developed after exposure for eight and ten minutes in the case of the cholera and of the cheese spirillum, and none at all in the case of the Finkler-Prior spirillum.

The following experiment was made at 52° C.

Date.	Organisms.	Temperature.	Time of exposure in minutes.
January 31, 1887	Cholera spirillum.	52° C. = 125.6° F.	20*, 4, 6, 8, 10, Cont.
	Cheese spirillum.	" " "	20*, 4, 6, 8, 10, Cont.
	Finkler-Prior spirillum.	" " "	20, 4, 6, 8, 10, Cont.

It will be noted that identical results were obtained throughout with the cholera and the cheese spirillum, while the Finkler-Prior spirillum proved to have a little less resisting power to heat.

The following experiment gives a result in accord with the above. It was made for the purpose of testing the question whether a difference would be shown in the resisting power of old and recent cultures. I may remark here that the cholera spirillum retains its vitality for several months, at least, in cultures which are kept in a moist condition. On the other hand, Koch has shown that it is quickly destroyed by desiccation.

Date.	Cholera spirillum.	Temperature	Time of exposure in minutes.
January 17, 1887	Fresh culture.	52° C. = 125.6° F.	20*, 4, 6, Cont.
	Culture 13 days old.	" " "	20*, 4, 6, Cont.

**ANTHRAX BACILLUS.**—Davaine first made experiments (1873) to determine the temperature required to destroy the vitality of the anthrax bacillus as found in the blood of an animal just dead. Under these circumstances no spores are present. The destruction of vitality was tested by inoculation into susceptible animals. This method is open to the objection that at temperatures approaching that which destroys vitality the development of the bacillus is retarded, and the animal is likely to suffer a non-fatal attack of the disease, which may escape observation. This is probably the explanation of the slight difference in the results obtained by Davaine and those of Chauveau made more recently.

Authority.	Temperature.	Time of exposure.	Remarks.
Davaine . . . . .	48°	15 minutes.	In blood.
Davaine . . . . .	50	10 "	" "
Davaine . . . . .	55	5 "	" "
Chauveau . . . . .	50	20 "	Cultures.
Chauveau . . . . .	54	10 "	"



According to Flügge, anthrax spores are killed by exposure to 100° C. for two minutes. In a recent experiment by the writer a single colony developed after exposure to this temperature for two minutes, but there was no growth when the time was extended to four minutes.

BACILLUS OF GLANDERS—Löffler<sup>1</sup> has recently determined the thermal death-point of the *Rotz* bacillus. He finds it to be 55° C., the time of exposure being ten minutes.

BACILLUS OF SWINE PLAGUE (German, *Schweine rothlauf*; French, *Rouget*). BACILLUS OF MOUSE SEPTICÆMIA (Koch).—Pasteur's bacillus of *rouget* is, no doubt, identical with the bacillus of *Schweine rothlauf* of the German bacteriologists. I have experimented upon cultures from both sources. The bacillus of mouse septicæmia is also supposed by some authors to be identical with the above. According to Eisenberg, the bacillus of mouse septicæmia forms spores. Flügge says of the bacillus of *Schweine rothlauf*:

"In bouillon cultures which have been kept for three days at the room temperature, or for twenty-four hours at 40°, one notices the formation of small spherical bodies, which probably represent spores; although, on account of their minuteness, the formation and development of these bodies have not, up to the present time, been exactly observed."<sup>2</sup>

My experiments upon the thermal death-point of these organisms are included in the following tables.

#### CULTURES IN FLESH-PEPTONE-GELATINE.

Date.	Organism.	Temperature to which exposed.
January 20, 1887 . . . . .	Mouse septicæmia.	50°, 60, Cont.
January 26, " . . . . .	Mouse septicæmia. <i>Schweine rothlauf</i> .	52°, 54, 56*, 58, Cont. 52°, 54, 56, Cont.
February 7, " . . . . .	Mouse septicæmia. <i>Schweine rothlauf</i> .	60°, Cont. 60°, Cont.
February 8, " . . . . .	Mouse septicæmia. <i>Rouget</i> .	54°, 56*, 58, Cont. 52°, 54, 56*, 58, Cont.

#### CULTURES IN BOUILLON.

Date.	Organism.	Temperature to which exposed.
March 17, 1887 . . . . .	<i>Rothlauf</i> .	60°, 65, Cont.
	Mouse septicæmia.	60°, 65, Cont.

These bouillon cultures were kept in the incubating oven at 38° for three days, and afterward at the room temperature for eight days. The bacilli were found to have grown out into slender filaments, which pre-

<sup>1</sup> Arbeiten a. d. Kaiserlichen Gesundheitsamte, Bd. 1, Heft 5.

<sup>2</sup> Die Mikroorganismen, p. 246.

sented the appearance of having vacant places in their protoplasm, which possibly represented spores. As will be seen by reference to the table, no growth occurred after exposure to a temperature of 60° C. for ten minutes. We must, therefore, admit either that this bacillus does not form spores under the circumstances stated by Flügge, or that the spores are destroyed at the comparatively low temperature named.

In the following table I include several species of pathogenic and non-pathogenic bacilli in which the question of spore-formation has not been definitely settled. In regard to the first-named (Emmerich's bacillus) Eisenberg remarks "spore-formation not yet observed." According to Flügge, *B. sputig. crassus* "appears to form spores at a temperature of 35°." The bacillus of blue milk is said by Eisenberg to form spores in gelatine cultures after the third day. The lactic acid ferment is said by the same author to form spores at the ends of the rods, which appear as spherical, shining, highly refractive bodies. In my own examinations of stained cover-glass preparations from the cultures used in the following experiments, I have in no instance been able to satisfy myself of the presence of spores.

#### RECENT CULTURES IN FLESH-PEPTONE-GEIATINE.

Organism.	Date.	Temperature to which exposed ten minutes.
Emmerich's bacillus . . . . .	January 24, January 28, February 1,	60°, Cont. 70°, 80, 90, 100, Cont. 60°, 62, 64, Cont.
Brieger's bacillus . . . . .	January 24, February 1,	60°, Cont. 58°, 60°, 62°, Cont.
Friedländer's bacillus . . . . . (So-called "pneumo-coccus.")	December 24, January 8, January 11, January 20,	50°, 52*, 54*, Cont. 58°, 60, 62, 64, Cont. 54°, 56*, 58, Cont. 56°, 58, Cont.
Bacillus sputig crassus . . . . . (Kreibohn.)	January 24, January 28, January 31,	60°, Cont. 50°, Cont. 54°, 56, 58, Cont.
Bacillus pyocyanus . . . . . (Green pus.)	December 24, December 31, January 8, January 17, February 2,	70°, 80, Cont. 46°, 48, 50, Cont. 58°, 60, 62, 64, Cont. 52°, 54*, Cont. 54°, 56, 58, Cont.
Bacillus indicus . . . . .	January 21, January 25, January 26, February 2,	56°, 60, Cont. 56°, 58, Cont. 52°, 54*, 56, Cont. 54°, 56, 58°, Cont.
Bacillus prodigiosus . . . . . (Commonly called micrococcus prodigiosus.)	January 21, January 25, January 26, February 2,	56°, 60, Cont. 56°, 58, Cont. 52°, 54*, 56*, Cont. 54°, 56, 58, Cont.
Bacillus cyanogenus . . . . . (Bacillus of blue milk.)	January 28, January 31,	50°, 60, Cont. 54°, 56, 58, Cont.
Bacillus fluorescens . . . . .	January 28, January 31,	50°, 60, Cont. 54°, 56, 58, Cont.
Bacillus acidi lactici . . . . .	January 24, January 26, February 1, February 8,	60°, Cont. 52°, 54, 56, Cont. 60°, 62, 64, Cont. 54°, 56, 58, Cont.

POTATO CULTURES IN INCUBATING OVEN FOR THREE DAYS, AT 38°,  
TO TEST FOR SPORES.

(No spores seen on microscopic examination of stained cover-glass preparations.)

Organism.	Date.	Temperature to which exposed.
<i>Bacillus pyocyaneus</i> . . . . .	March 1, 1887.	60°, 65, <b>Cont.</b>
Emmerich's bacillus . . . . .	" "	60°, 65, <b>Cont.</b>
Brieger's bacillus . . . . .	" "	60°, 65, <b>Cont.</b>
<i>Bacillus acidi lactici</i> . . . . .	" "	60°, 65, <b>Cont.</b>

OLD CULTURES IN FLESH-PEPTONE-GELATINE, TO TEST FOR SPORES.

(March 7, 1887.)

Organism.	Age of culture.	Temperature to which exposed.
Brieger's bacillus . . . . .	36 days.	60°, 65, <b>Cont.</b>
Emmerich's bacillus . . . . .	43 "	60°, 65, <b>Cont.</b>
<i>Bacillus pyocyaneus</i> . . . . .	46 "	60°, 65, <b>Cont.</b>
<i>Bacillus fluorescens</i> . . . . .	42 "	60°, 65, <b>Cont.</b>
<i>Bacillus cyanogenus</i> . . . . .	33 "	60°, 65, <b>Cont.</b>
<i>Bacillus acidi lactici</i> . . . . .	42 "	60°, 65, <b>Cont.</b>

It will be seen that in all of these experiments the lactic acid ferment is the only one which resisted a temperature of 60° C; and if the presence of spores could be determined by this test, this is the only organism in the list in which there is any evidence of spore formation. I am not, however, disposed to accept this test, and think it not improbable that some of the bacilli in the list form reproductive spores, which differ from those of the anthrax bacillus and certain other spore-forming bacilli, in the fact that they are destroyed at a comparatively low temperature. The only way to settle this question will be by the method of direct observation. If the refractive spherical bodies, supposed to be spores, which may be seen in potato cultures of the typhoid bacillus, in bouillon cultures of the bacillus of swine plague, etc., are observed to develop into bacilli, they will be demonstrated to be reproductive elements, or spores, notwithstanding the fact that they are destroyed by so low a temperature as 60° C.

The following experiments have been made with pathogenic and non-pathogenic bacilli which are known to form spores.



Organism.	Date.	Temperature to which exposed ten minutes.
<i>Bacillus alvei</i> (foul brood of bees) . . {	December 8, December 30,	80° Cont. 90°, 100, Cont.
<i>Wurtzel bacillus</i> . . . . {	January 24, January 28,	60° Cont. 70°, 80, 90, Cont.
<i>Bacillus butrycus</i> . . . . {	December 23, December 31,	80° Cont. 90°, 100, Cont.

The following experiments have been made upon these spore-forming bacilli at a temperature of 100° C. (212° F.). the time of exposure being varied.

Organism.	Date.	Time of exposure in minutes.
<i>Anthrax bacillus</i> . . . . .	February 9,	2*, 4, 6, 8, 10, Cont. * A single colony.
<i>Bacillus alvei</i> . . . . .	February 9,	2*, 4, 6, 8, 10, Cont. * A few colonies.
<i>Bacillus butrycus</i> . . . . .	February 9,	2, 4, 6, 8, 10, Cont.
<i>Wurtzel bacillus</i> . . . . .	March 4,	2*, 4, 6, 8, 10, Cont. * A single colony.

**BACILLUS TUBERCULOSIS.**—Schill and Fischer (1884), assuming that the tubercle bacillus forms spores, made quite a number of experiments to determine its thermal death-point. Using fresh sputum as the material, and testing the destruction of the vitality of the bacilli contained in this material by inoculations into guinea-pigs, they found that exposure to a temperature of 100° C., in steam, was efficient when the time of exposure was five minutes. When the time was reduced to two minutes a negative result was obtained in two out of three guinea-pigs inoculated, but in one death from tuberculosis occurred.

My experiments upon micrococci are recorded in the following table.

#### RECENT CULTURES OF MICROCOCCI IN FLESH-PEPTONE-GELATINE.

Organism.	Date.	Temperature to which exposed ten minutes.
<i>Micrococcus of osteomyelitis</i> . . {	December 8, 1886. December 20, February 8, 1887.	50°, 52, 54, 56, 58, Cont. 52°, 54, 56*, Cont. 54°, 56*, 58, Cont.
<i>Staphylococcus pyog. aureus</i> . .	January 11, 1887.	54°, 56*, 58, 60, Cont.
<i>Staphylococcus pyog. citreus</i> . . {	January 8, 1887. January 11, January 20,	58°, 60*, 62, 64, Cont. 54°, 56, 58*, 60*, 56°, 58*, 60, Cont.
<i>Staphylococcus pyog. albus</i> . . {	December 26, 1886. January 11, 1887.	52°, 54, 56*, Cont. 54°, 56, 58*, 60*.
<i>Streptococcus erysipelatus</i> . . {	December 28, 1886. January 20, 1887. January 25,	48°, 50, 52, Cont. 50°, 52, 58, Cont. 54°, 56, Cont.
<i>Micrococcus tetragenus</i> . . . .	January 25, 1887.	54°, 56*, 58, Cont.
<i>Micrococcus Pasteuri</i> . . . . {	March 29, 1887. April 7,	50°, 52, 54, 56, 58, Cont. 46°, 48, 50*, 52, Cont.

## FRESH CULTURES OF SARCINÆ IN FLESH-PEPTONE-GELATINE.

Organism.	Date.	Temperature to which exposed.
Sarcina aurantiaca . . . . .	December 24, 1886.	56°, 58°, 60°, Cont.
	January 11, 1887.	54°, 56°, 58°, 60.
	January 18,	58°, 60, Cont.
Sarcina lutea . . . . .	December 29, 1886.	56°, 58°, 60°, Cont.
	January 7, 1887.	58°, 60°, 62°, 64, Cont.
	January 11,	56°, 58, 60°, Cont.
	January 18,	60°, 62, 64, Cont.

GONOCOCCUS OF NEISSER.—Believing, as I now do, that this organism is the cause of the infectious virulence of gonorrhœal secretions (see *The Medical News* of Feb. 26, 1887), I have made the following experiment with reference to its thermal death-point. Some gonorrhœal pus from a recent case which had not undergone treatment, was collected for me by my friend, Dr. George H. Rohé, in the capillary tubes heretofore described. A microscopical examination of stained cover-glass preparations showed that this pus contained numerous “gonococci” in the interior of the cells. Two of the capillary tubes were placed in a water bath maintained at 60° C. for ten minutes. The pus was then forced out upon two pledgets of sterilized cotton wet with distilled water. Two healthy men had consented to submit to the experiment, and one of these bits of cotton was introduced into the urethra of each and left *in situ* for half an hour. As anticipated, the result was entirely negative. For obvious reasons no control experiment was made, and no attempt was made to fix the thermal death-point within narrower limits.

In connection with these experiments upon the thermal death-point of known pathogenic organisms, it is of interest to inquire whether the virulence of infectious material in which it has not yet been demonstrated that this virulence is due to a microorganism, is destroyed by a correspondently low temperature. Evidently, if this proves to be the case, it will be a strong argument in favor of the view that we have to deal with a microorganism in these diseases also. We have experimental proof that a large number of pathogenic organisms are killed by exposure for ten minutes to a temperature of from 55° to 60° C. But, so far as I am aware, this low temperature would not be likely to destroy any of the poisonous chemical products which might be supposed to be the cause of infective virulence—leaving aside the fact that such chemical products have no power of self-multiplication, and, therefore, could not be the independent cause of an infectious disease.

VACCINE VIRUS.—Carstens and Coert have experimented upon the temperature required to destroy the potency of vaccine virus. In a paper read at the meeting of the International Medical Congress, in 1879, they report as the result of their experiments that the maximum

degree of heat to which fresh vaccine can be exposed without losing its virulence, probably varies between  $52^{\circ}$  and  $54^{\circ}$  C.

**RINDERPEST.**—According to Semmer and Raupach,<sup>1</sup> exposure for ten minutes to a temperature of  $55^{\circ}$  C. destroys the virulence of the infectious material in this disease.

**SHEEP-POX.**—The authors last mentioned<sup>2</sup> have also found that the same temperature— $55^{\circ}$  C. for ten minutes—destroys the virulence of the blood of an animal dead from sheep-pox.

**HYDROPHOBIA.**—Desiring to fix the thermal death-point of the virus of hydrophobia, I obtained through the kindness of Dr. H. C. Ernst, a rabbit which had been inoculated, by the method of trephining, with material which came originally from Pasteur's laboratory (see Dr. Ernst's paper in the April number of this journal). The rabbit sent me showed the first symptoms of paralytic rabies on the eighth day after inoculation. It died on the eleventh day (March 2, 1887), and I at once proceeded to make the following experiment:

A portion of the medulla was removed and thoroughly mixed with sterilized water, the milky emulsion was introduced into four capillary tubes, such as had been used in my experiments heretofore recorded. Two of these tubes were then placed for ten minutes in a water bath, the temperature of which was maintained at  $60^{\circ}$  C. Four rabbits were now inoculated by trephining, two with the material exposed to  $60^{\circ}$  C. for ten minutes, and two with the same material from the capillary tubes not so exposed. The result was as definite and satisfactory as possible. The two control rabbits were taken sick, one on March 10, and one on the 11th; both died with the characteristic symptoms of paralytic rabies on the third day. The two rabbits inoculated with material exposed to  $60^{\circ}$  C. remained in perfect health. On the 26th of March one of these rabbits was again inoculated by trephining with material from the medulla of a rabbit just dead from hydrophobia. This rabbit died from paralytic rabies on the 8th of April. Its companion remains in perfect health.

A second experiment was made in the same way on the 14th of March. Two rabbits were inoculated with material exposed for ten minutes to a temperature of  $50^{\circ}$  C.; two with material exposed for the same time to a temperature of  $55^{\circ}$  C.; and two control rabbits with material not so exposed. One of the rabbits inoculated with material exposed to  $50^{\circ}$  C. and one of the control rabbits died on the 25th, the other rabbit inoculated with the material exposed to  $50^{\circ}$ , the other control, and one inoculated with material exposed to  $55^{\circ}$ , on the 26th. The second rabbit inoculated with material exposed to  $55^{\circ}$  died five days later with the characteristic symptoms of the disease.

These experiments show then that the virus of hydrophobia is

<sup>1</sup> Deutsche Zeitschrift für Thier med., vii. p. 347.

<sup>2</sup> Ibid.



destroyed by a temperature of 60° C., and that 55° C. fails to destroy it—the time of exposure being ten minutes.

For convenience of reference the results obtained in my own experimental studies, and those of others referred to, are brought together in a single table. Where the determination has not been made by myself the authority is given in parentheses after the name of the organism. The time of exposure is ten minutes, unless otherwise indicated by figures in parentheses following those representing the temperature. The table includes those non-pathogenic organisms which have been tested as well as those which are recognized as pathogenic. In this table I have adopted the nomenclature used by Dr. Flügge in his recent work *Die Mikroorganismen*.

## THERMAL DEATH-POINT OF MICROÖRGANISMS.

NAME OF ORGANISM.	CENTIGRADE.	FAHRENHEIT.
<i>Spirillum cholerae Asiaticæ</i> . . . . .	52°	125.6° (4 m.)
<i>Spirillum tyroenum</i> <sup>1</sup> . . . . .	52	125.6 (4 m.)
<i>Spirillum Finkler-Prior</i> . . . . .	50	122
<i>Bacillus anthracis</i> (Chauveau) . . . . .	54	129.2
<i>Bacillus typhi abdominalis</i> . . . . .	56	132.8
<i>Bacillus mallei</i> <sup>2</sup> (Löffler) . . . . .	55	131
<i>Bacillus of schweine-rothlauf</i> (Rouget of Pasteur) . . . . .	58	136.4
<i>Bacillus murissepticus</i> . . . . .	58	136.4
<i>Bacillus Neapolitanus</i> <sup>3</sup> . . . . .	62	143.6
<i>Bacillus cavicola</i> <sup>4</sup> . . . . .	62	143.6
<i>Bacillus pneumoniae</i> <sup>5</sup> . . . . .	56	132.8
<i>Bacillus crassus sputigenus</i> . . . . .	54	129.2
<i>Bacillus pyocyaneus</i> . . . . .	56	132.8
<i>Bacillus indicus</i> . . . . .	58	136.4
<i>Bacillus prodigiosus</i> . . . . .	58	136.4
<i>Bacillus cyanogenus</i> . . . . .	54	129.2
<i>Bacillus fluorescens</i> <sup>6</sup> . . . . .	54	129.2
<i>Bacillus gallinarum</i> (Salmon) <sup>7</sup> . . . . .	56	132.5
<i>Bacillus acidi lactici</i> <sup>8</sup> . . . . .	56	132.8
<i>Bacillus alvei</i> ; spores . . . . .	100	212 (4 m.)
<i>Bacillus anthracis</i> ; spores . . . . .	100	212 (4 m.)
<i>Bacillus butyricus</i> ; spores . . . . .	100	212 (4 m.)
<i>Bacillus mycoides</i> ; spores . . . . .	100	212 (4 m.)
<i>Bacillus tuberculosis</i> (Schill and Fischer) . . . . .	100	212 (4 m.)
<i>Staphylococcus pyogenes aureus</i> . . . . .	58	136.4
<i>Staphylococcus pyogenes citreus</i> . . . . .	62	143.6
<i>Staphylococcus pyogenes albus</i> . . . . .	62	143.6
<i>Streptococcus erysipclatus</i> . . . . .	54	129.2
<i>Micrococcus tetragenus</i> . . . . .	58	136.4
<i>Micrococcus Pasteuri</i> . . . . .	52	125.6
<i>Micrococcus gonorrhoea</i> <sup>9</sup> . . . . .	60	140
<i>Sarcina lutea</i> . . . . .	64	147.2
<i>Sarcina aurantiaca</i> . . . . .	62	143.6
<i>Vaccine virus</i> (Carstens and Coert) . . . . .	54	129.2
<i>Rinderpest virus</i> (Semmer and Raupach) . . . . .	55	131
<i>Sheep pox virus</i> (Semmer and Raupach) . . . . .	55	131
<i>Hydrophobia virus</i> . . . . .	60	140

<sup>1</sup> Cheese spirillum.<sup>2</sup> Bacillus of glanders.<sup>3</sup> Emmerich's bacillus.<sup>4</sup> Brieger's bacillus.<sup>5</sup> Friedländer's.<sup>6</sup> From water.<sup>7</sup> Pasteur's "microbe du cholera des poules."<sup>8</sup> Old culture in flesh-peptone-gelatine not killed by 60°, probably owing to the presence of spores.<sup>9</sup> A single experiment. A lower temperature would probably be effective.

By reference to the various tables giving the experimental data in detail, it will be seen that the results are not absolutely uniform for the same organism. Thus, in the experiments upon the typhoid bacillus no growth occurred after exposure to 55° in one experiment (January 15), while in another (November 30) colonies of the typhoid bacillus grew out after exposure to this temperature. In this case the thermal death-point is placed at 56°, no growth having occurred after exposure to this temperature. Similar differences, when the temperature approaches that which is uniformly successful in destroying vitality, may be observed with reference to several of the organisms tested. But these differences are within comparatively narrow limits. They are probably due partly to a difference in resisting power depending upon the age of the culture, and partly to unavoidable variations in the temperature during the experiments. By very careful supervision and frequent stirring of the water-bath, variations in temperature have been kept within narrow limits, but it has been impossible to avoid them entirely. The same thermometer has been used throughout (made by Schlag and Berend, Berlin).

No attempt has been made to fix the thermal death-point within narrower limits than 2° C., and in the above table the lowest temperature is given which has been found, in the experiments made, to destroy all of the organisms in the material subjected to the test. No doubt more extended experiments would result, in some instances, in a reduction of the temperature given as the thermal death-point for a degree or more. But the results as stated are sufficiently accurate for all practical purposes, and permit us to draw some general conclusions:

(a) The temperature required to destroy the vitality of pathogenic organisms varies for different organisms.

(b) In the absence of spores, the limits of variation are about 10° Centigrade (18° F.).

(c) A temperature of 56° C. (132.8° F.) is fatal to the bacillus of anthrax, the bacillus of typhoid fever, the bacillus of glanders, the spirillum of Asiatic cholera, the erysipelas coccus, to the virus of vaccinia, of rinderpest, of sheep-pox, and probably of several other infectious diseases.

(d) A temperature of 62° C. (143.6° F.) is fatal to all of the pathogenic and non-pathogenic organisms tested, in the absence of spores (with the single exception of *sarcina lutea*, which, in one experiment, grew after exposure to this temperature).

(e) A temperature of 100° C. (212° F.) maintained for five minutes destroys the spores of all pathogenic organisms tested.

(f) It is probable that some of the bacilli which are destroyed by a

temperature of 60° C. form endogenous spores which are also destroyed at this temperature.<sup>1</sup>

The experimental study, the results of which are recorded in the present paper, was made, through the courtesy of Prof. Wm. H. Welch, in the pathological laboratory of Johns Hopkins University.

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### A CONSIDERATION OF THE RESULTS IN 327 CASES OF TRACHEOTOMY,

PERFORMED AT THE BOSTON CITY HOSPITAL FROM 1864 TO 1887.

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THE operation of tracheotomy was performed for croup 327 times at the Boston City Hospital from the time of its foundation in 1864 to January, 1887. Up to the year 1880, only 30 tracheotomies had been done, so that the greater part of the operations have been performed in the last six years. It should be noted, in passing, that a bad class of cases would naturally come to a city hospital for operation. In most instances being treated at home, medically, until an operation has become imperative and long after it has become advisable, they are brought hurriedly for operation often in a hopelessly bad condition. If the parents wish or if an operation seems likely to afford even temporary relief to the patient, tracheotomy is performed, and thus many hopeless cases are yearly operated upon; all of which are included in the analysis. We are indebted to the visiting surgeons of the hospital for permission to publish the following cases.

Of the 327 cases, 232 died and 95 (29.05 per cent.) recovered. The causes of death were, septicæmia in 62 cases, extension of the diphtheritic process to the trachea and bronchi (doubtless including many pneumonia cases) in 101 cases, exhaustion in 12 cases, death on the table in 10 cases, heart failure in 6 cases, various causes (pneumonia, peritonitis, scarlet fever, nephritis, embolism, marasmus) in 6 cases, undetermined in 35 cases.

Autopsies were so few that a clinical estimate of the cause of death had to serve in most cases; such a classification is approximate at best and the distinctions were by no means always clear. When death was preceded by gradually increasing dyspnœa it was considered that exten-

<sup>1</sup> This question demands further experimental investigation.



sion of the diphtheritic process to the bronchi was the cause of death and the truth of this was often proved by autopsy. In other cases profound septic poisoning was evident as the chief cause of death. These are the two great classes into which the majority of cases fall, other causes of death seeming incidental. Children with septicæmic symptoms died more quickly after operation than those dying by extension of the process to the bronchi. An average of the two classes showed that septicæmic patients died on the average two days after operation, while children dying by extension lived three days.

The relation of the number of deaths from extension to those from septicæmia is shown below.

	Extension.	Septicæmia.
In all the fatal cases . . . . .	1 $\frac{2}{3}$	to 1
In children under 2 years . . . . .	3 $\frac{1}{2}$	to 1
In children from 2 to 10 years . . . . .	1 $\frac{1}{3}$	to 1

It can be seen from this that young children are particularly liable to that distressing cause of death, extension of the process to the bronchi. When this happens there is no euthanasia, death is the slowest and most painful of suffocations, and only when septicæmia to the point of stupefaction is present at the same time does the child escape a horrible amount of suffering. The frequency of this painful ending then is not to be lost sight of in recommending the operation as a means of euthanasia, especially in children under two years of age.

10 cases died on the table. 2 of these evidently died of heart failure, for they stopped breathing before the trachea was opened and had but slight hemorrhage. 4 had profuse hemorrhage, and 2 died of shock some little time after the tube was put in place and everything seemed favorable. In the remaining 2 cases the records are not full. The 6 cases classed as heart failure did not die on the table, but from the first to the fifth day after operation.

An attempt was made to find the ultimate result in the 95 patients that recovered. 23 cases recovered in 1886, and were considered as too recent to be of value.

Of the 72 that recovered previous to January, 1886, 56 have been personally investigated, while 16 could not be found. The research was made especially difficult by the fact that it was so common for the parents to move after an attack of diphtheria and the consequent investigation by the Board of Health. Of the 72 families, 57 had moved at least once. 15 cases were seen from one to two years after operation; 16 cases in three years; 12 cases in four years; 2 cases in five years; 6 cases in six years; 4 cases in seven years; 1 case in twenty-one years. 26 have never been ill in any way since recovery from the operation.

7 have had pneumonia, measles, or mumps, but have fully recovered, no one of them having had croup at the time of illness. 2 have had diphtheria a second time without laryngeal complication; 1, nine years old, two years after operation, and 1, twenty years old, four years after.

With eight exceptions, the patients have been free from any attack of croup since operation. One, five years old, operated on in 1885, has had two attacks, one of which was quite severe. One, ten years old, operated on in 1884, has had one or two attacks, and is in poor general condition. One, four years old, operated on in 1885, is apt to be croupy with a slight cold. One, six years old, operated on in 1885, the same. One, fourteen years old, operated on in 1883, the same. One, ten years old, operated on in 1885, has croupy cough. One, seven years old, operated on in 1884, was liable to be croupy for a while after operation, but is not so now. One, eleven years old, operated on in 1883, the same.

Of complications coming after operation, one had nephritis and paralysis, but recovered; one had nephritis for four months. One had "abscesses." One, a boy ten years old, operated on in 1881, could not blow his nose for two years, but is well now.

There have been no deaths in the 56 cases investigated, and there is no reason to believe that these are any more favorable than the 16 that could not be found.

As to present condition, 53 may be said to be in good general health: 10 to 15 are said to take cold more easily than before. That it is not a very serious matter may be seen by the fact that only 6 are said to be liable to sore throats, of whom 2 have tonsillitis at times, and the remainder are liable to have sore throats when they catch cold. Of the 3 who were found not to be in good condition, one, six years old, operated on a year and a half ago, has phthisis, but no laryngeal symptoms. The second, noted above, is in bad general condition, hoarse, and croupy. The third is a delicate boy, five years old, with no positive signs of trouble except a tendency to croup and illness.

The voice is clear in all but 4 cases; in one of the latter, a girl of thirteen, operated on two years ago, the voice is not so clear as before operation, and she cannot sing so high as before. The second, four years old, has a fairly clear voice, but it is said to be less so than before operation, two years ago; two are said to be hoarse when they have slight colds. The scars in all cases are healed and are more or less conspicuous according to the severity of the original wound; none were found adherent, and in no instance had the scar travelled downward toward the sternum as mentioned by Neukomm.<sup>1</sup> In nearly all the cases a linear depression in the trachea admitting the edge of the finger-nail could be

<sup>1</sup> Neukomm: *Centralb. f. Chirurg.*, 1885, No. 38.

felt at the site of the original wound, but in one case operated on in 1880, by the low operation, no nick was felt in the trachea.

There were 4 cases of stenosis which are noted later in the article.

It has been stated that<sup>1</sup> the operation tends to become less fatal in any place as the years go by. In Berlin<sup>2</sup> the death-rate after operation fell 22 per cent. in six years, and in Paris,<sup>3</sup> at the Hôpital des Enfants Malades, it fell nearly 30 per cent. in six years.

In 11,696 cases reported by Agnew,<sup>4</sup> in 1878, the recovery per cent. was 26.25. In 1137 cases reported since then which were grouped merely for comparison on this point, the recovery rate was 33.8 per cent. But in the present series of cases no such result was noted. From 1881 to 1885 the recovery per cent. fell from 35 to 26; in 1886 it rose again to 29, but the general tendency has been downward, a fact which is probably dependent on the extension of the operation to more and more hopeless cases each year. Moreover, Wanscher,<sup>5</sup> in Copenhagen, in several years noted no such falling off in the fatality per cent. Statistics definite enough to clear up the point are too few.

It became apparent while studying the cases that there was a marked variation in the proportion of recoveries at the different seasons of the year. Therefore, a calculation was made of the average monthly mortality per cent. in each of the twelve months for five years preceding 1886, and the result is shown graphically in Table I. It will be seen that in the winter months the smallest proportion of cases recover, not 20 per cent. in December, February, and March, while from the latter month the recovery rate rises until July, when about 60 per cent. of all cases operated on get well. In a general way, each year showed the same tendency when considered by itself. As a matter of interest, the per cent. of mortality from diphtheria in the city at large was calculated by the month for the same five years from the tables of the Board of Health,<sup>6</sup> and a very striking correspondence was noticed. The diphtheria mortality per cent. curve is shown in Table IV.

To see if the tracheotomy mortality per cent. bore a similar relation to other zymotic diseases than diphtheria, the monthly mortality per cent. of scarlet fever (chosen only as a representative) for the same five years was calculated for the whole city, and the result is shown in Table VII.

By comparison of these three tables it will be seen that from 1881 to 1885 inclusive, the tracheotomy death-rate at the Boston City Hospital

<sup>1</sup> Hugonnet : Das erste 100 Croup Operationen in Zürich. Inaug. Diss., Zürich, 1878.

<sup>2</sup> Krönlein : Archiv f. klin. Chir., Bd. xxi, Heft 2.

<sup>3</sup> Bourdillat : Bull. et Soc. Méd. Hôp. Paris, 1867, 39.

<sup>4</sup> Agnew : System of Surgery, vol. iii.

<sup>5</sup> Wanscher : Om Diphtheritis og Croup saerlight med. Hyensyen til Tracheotomien ved Samme for Doctor graded i Medicinen. Kjøbenhavn, 1877.

<sup>6</sup> Reports of the Boston Board of Health, 1881-85.



varied by the month in the closest correspondence to the mortality per cent. of diphtheria for the same time in the whole city of Boston, and that it did not vary at all in correspondence with the death-rate from scarlet fever in the whole city. Nor does it correspond to the general monthly mortality of the city for all diseases during the same five years. In a word, when diphtheria is most fatal in the city, tracheotomy is most fatal at the hospital. That this variation is not due to the greater prevalence of scarlet fever or diphtheria at different seasons is shown by Tables II. and V., which show the monthly number of cases reported for the five years of each disease. It is also of much interest to see how closely the number of deaths from croup and diphtheria in the whole city correspond when considered by the month in the same way. (Table III.) The same correspondence was noted for 1876-77 by Dr. F. W. Draper.<sup>1</sup>

It does not come within the scope of this paper to enter upon any discussion as to the identity of croup and diphtheria; at the same time it is easy to see that the correspondences and variations noted above lend a very strong weight to the assertion that croup and diphtheria are one and the same disease. However it may be in other places, idiopathic, non-diphtheritic croup is very rare in Boston; whether it exists at all is questioned by many. The overwhelming majority of all cases coming for operation to the hospital present some signs of diphtheritic infection, membrane in the throat or nose, enlarged glands in the neck, albuminuria, septicæmia, and the like.

If the seasonal death-rate from diphtheria in a city affects the tracheotomy death-rate so much as our tables would seem to show, we should expect that in cities where a low death-rate from diphtheria prevails unusually favorable results would follow tracheotomy. And this may account for the otherwise inexplicable figures given by Wanscher, of Copenhagen, where of 400 cases operated on in hospital practice 42 per cent. recovered. The table shows the rest.

	To the 1000 of the living population.
General death-rate in Copenhagen, 1880-1885 . . .	22.8
General death-rate in Boston, 1880-1885 . . .	22.5
Diphtheria death-rate in Copenhagen, 1880-1885 . . .	0.25
Diphtheria death-rate in Boston, 1880-1885 . . .	1.35

Unfortunately, statistics are not to be obtained for similar investigation in other cities.

The presence of membrane in the pharynx is by no means an invariable accompaniment of the laryngeal trouble, for it was noted as having been present in the pharynx in 158 cases and absent in 93, while in 76 there was no definite note. It was undoubtedly seen but not noted in

<sup>1</sup> Reports of Boston Board of Health, 1877-78.

many cases, whereas nearly every case in which it was absent was probably entered in the notes, so that the figures given above by no means represent the true proportion. But the interest of the two classes of cases lies in the difference of their death-rates. Of the 158 cases where membrane was present in the pharynx at the time of operation 44 or 28 per cent. recovered, in the 93 cases where membrane was absent from the pharynx 37.6 per cent. recovered.<sup>1</sup> That this difference in the per cent. is not due to the fact that the cases where membrane was absent were older children, is shown by the average age of the two classes:

Where membrane was present the average age of the 158 cases was 4.4 years.

Where membrane was absent the average age of the 93 cases was 4.1 years.

That is, in spite of the fact that the children were younger, 10 per cent. more recovered where membrane was not present in the pharynx at the time of operation.

In the majority of cases the attack of croup had been preceded by illness varying from one to seven days in duration. Oftenest there was the history of an attack of pharyngeal diphtheria preceding, but sometimes there had only been a day or so of general malaise without definite throat symptoms. In an average of 225 cases the attack of croup came on the fifth day of the illness, and in only 10 cases was the croup not preceded by at least one day's illness.

Perhaps the most important question of all is the influence of early or late operation as it affects recovery, as it is one of the very few conditions under the control of the surgeon. The table shows the recovery-rate in cases operated upon within one, two, three, and four days after the beginning of the obstructed respiration.

Day of operation.	Number of cases.	Recovery.	Per cent. of recovery.
1	123	40	32.5
2	86	24	28.0
3	33	8	25.3
4	7	1	14.0

In the same line of argument the amount of the patient's dyspnoea at the time of operation serves to advocate the performance of tracheotomy while the dyspnoea is yet moderate. In 154 cases the dyspnoea before operation was noted as "severe;" of these, 21 per cent. recovered. In 124 where it was noted as "moderate," 35 per cent. recovered. The argument against early operation is of course the possibility of a patient's recovery from even severe dyspnoea without tracheotomy; on this point

<sup>1</sup> Honsell: Aerztl. Mittheil. aus Baden, xxxvi., 1882.

authorities differ very widely. Steiner<sup>1</sup> has seen only three recoveries of this sort. Mackenzie<sup>2</sup> sets the death-rate without operation at 90 per cent., and in 33 cases of croup treated medically many years ago by Dr. John Ware,<sup>3</sup> 30 died. On the other hand are arrayed Lewis Smith,<sup>4</sup> Meigs and Pepper,<sup>5</sup> and Agnew,<sup>6</sup> who believe that recovery without operation is more frequent than has commonly been supposed. The experience at the City Hospital has been as follows: forty cases of diphtheritic croup have been treated medically and every one died. Dr. G. W. Gay, visiting surgeon, wrote in 1885,<sup>7</sup> "Not a single case of pseudo-membranous laryngitis has ever recovered in this hospital without operation." And he quoted Dr. D. W. Cheever, senior visiting surgeon, as writing to him in 1884,<sup>8</sup> "After reflection I cannot recall a case of membranous laryngitis that I have known to recover without tracheotomy." Since Dr. Gay's article was written there have been two recoveries from moderate dyspnoea without operation.

The age of the patient is, of course, an important consideration, the mortality-rate falls as the age increases, up to eight or ten years. In 1600 cases collected from Cohen,<sup>9</sup> Schüller,<sup>10</sup> Birnbaum,<sup>11</sup> Mastin,<sup>12</sup> etc., and tabulated with regard to the age of the patients, the recovery-rate in children less than two years old was 20 per cent., rising steadily until the age of eight years was reached, when it was 40 per cent. The 327 cases reported here followed much the same course, except in the youngest children, where the operation proved much more fatal. Of 42 patients under two years of age only 3 recovered, 1 eleven months old, and 2 fifteen months old, all nursing children. The oldest case to recover was a girl sixteen years old, and several adults died.

There are several minor symptoms that deserve mention. Nasal discharge was almost always present and had no special significance. When it was associated with severe septicæmia it was ordinarily foul-smelling. Cervical glandular swelling, in the same way, was generally present, being noted as absent in only 24 cases. It was present in all sorts of cases, and its only significance was that when it gradually increased after operation, death from septicæmia followed in an overwhelming majority of cases. To be sure, two or three cases got well after having developed an amount of glandular swelling that made the neck

<sup>1</sup> Steiner, quoted by Gay: Wood's Ref. Handbook of Med. Sci., vol. ii. p. 344.

<sup>2</sup> Mackenzie: Diseases of the Throat and Nose.

<sup>3</sup> Ware, quoted by Gay, *Ibid.*

<sup>4</sup> Lewis Smith: Dis. of Children, Phila., 1881; also Amer. Journ. of Med. Sci., April, 1885, p. 319.

<sup>5</sup> Meigs and Pepper: Diseases of Children.

<sup>6</sup> Agnew, *loc. cit.*

<sup>7</sup> Gay: Wood's Ref. Handbook of Med. Sci., vol. ii. p. 344.

<sup>8</sup> Gay: Phila. Med. News, July 12, 1884.

<sup>9</sup> Cohen: Croup in its Relation to Tracheotomy, 1884.

<sup>10</sup> Schüller: Deutsche Chir., Lief 37, Stuttgart.

<sup>11</sup> Birnbaum: Arch. f. klin. Chir., xxxi. p. 333.

<sup>12</sup> Mastin: Gaillard's Med. Journ., xxix. 1 p. 1.



double its ordinary size, but in general when the neck tape had to be loosened, after it was once tied in place, it meant death for the patient.

Albumen was present in the urine of five-sixths of all the cases in which an examination was made and recorded (75 in number). It appeared in all classes of cases and was particularly abundant in bad cases of septicæmia. Sugar was temporarily present in the urine of one child who recovered.

The discharge from the trachea tube after operation furnished perhaps the most important indication of a patient's progress. The discharge was classified as loose and as gummy, and the line between the two classes was easy enough to draw ordinarily. The inner tube was always taken out and cleaned every two or three hours, and at these times the character of the discharge taken from it was noted. Sometimes there was no discharge at all, and then the case was classed as "discharge suppressed;" when it was gummy it was always scant. The importance of the tube discharge with reference to the prognosis of the cases is shown in the following table:

	Number of Cases.	Number of Recoveries.	Per cent.
When the discharge was loose through- out . . . . .	83	53	60
When the discharge was gummy at any time, even temporarily . . . .	86	11	13
When the discharge was suppressed . .	15	0	0

The notes were indefinite in the other 143.

The appearance of blood in the tube discharge was a matter of no significance. It was always present for a while after operation and reappeared in all classes of cases at irregular intervals, sometimes as late as the fifth day after operation.

The temperature possessed no more than its usual significance in acute febrile diseases; when it rose higher than 105° at any time the child rarely recovered. The temperature generally rose several degrees after operation, but it was of no significance unless, as pointed out by Ripley,<sup>1</sup> it remained high, when it could be inferred that the disease was progressing unfavorably. But a marked rise on the third, fourth, or fifth day after operation was the most ominous sign and generally ushered in a fatal result. In the majority of cases the temperature ranged between 99° and 103°.

The treatment in all these years has, of course, varied very much. Of late years the steam pipes in the tracheotomy rooms have been tapped, and for several days after operation every child lies in a cloud of steam coming from these pipes. In former years a hand atomizer was used. Free stimulation and milk *ad libitum* form the treatment of

<sup>1</sup> Ripley : Med. Record, Jan. 24, 1885.

nearly all cases after operation. 66 cases were treated with mercury in small and frequent doses ( $\frac{1}{60}$  of a grain of corrosive sublimate or  $\frac{1}{4}$  of a grain of calomel every two hours), and the recovery per cent. was 28, and did not differ materially from the recovery per cent. of 156 cases which were treated by steam, brandy, and milk, where 40 cases, or 25 per cent., got well. Quinine was given through the course of the disease in 53 cases, and the recovery per cent. here was 39, much larger than in the other cases mentioned above, but the numbers are altogether too small to warrant any conclusions as to the comparative efficacy of different methods of treatment.

In turn, ipecac, lime-water spray, chlorate of potash, iron, pilocarpine, pepsine, etc., have held the chief place, but the number of cases in which each has figured is too small to be worth analyzing, and iron, quinine, and mercury hold the chief places. In connection with the mercurial treatment, it should be mentioned that an excessive flow of saliva is an occasional accompaniment of laryngeal diphtheria. This was noted in several cases in which mercury was not used at all, and for that reason the drug is probably credited with much salivation for which it is not accountable. In the same way diarrhœa, many times noted after the continued use of calomel in  $\frac{1}{4}$  grain doses, often came on where no mercurial had been administered. Young children took  $\frac{1}{60}$  of a grain of corrosive sublimate for two or three days, and within that limit they were rarely salivated, and still more rarely did they have diarrhœa. If it was continued longer, or if it was given in larger doses, it was apt to cause one or both. Calomel, on the other hand, was likely to cause diarrhœa, if used even moderately.

When a patient progressed well, on the fifth, sixth, or seventh day the neck tape was cut, and the tube was taken out quietly, without any preliminary testing of the larynx by stopping the tube. In 65 cases of the 95 which recovered, the tube was finally removed by the eighth day (once on the third day, and twice on the fourth), and was not replaced. In 9 cases it was necessary to put back the tube within a few hours of its first removal, and to leave it for a few days more, on account of the difficulty which the child experienced in breathing without the tube. In 4 others it had to be replaced a second time, but it was not worn more than a month altogether in any one of them, while in 4 others it was impossible to remove the tube definitely for periods varying from 3 months to 3 years. These four cases have been reported elsewhere.<sup>1</sup> This difficulty in getting the children to breathe without their tubes at the usual time for so doing did not seem to be due to any unusually early or late time of the first attempt at removal. In most of them, as in the others, the attempt at removal

<sup>1</sup> Lovett: Boston Med. and Surg. Journal, July 22, 1886.

was made on the fifth, sixth, or seventh day, and not until the dyspnoea began (usually some hours after the tube was taken out) was there any indication that matters were to go wrong. These were average cases in every other way.

Diphtheria of the wound was noted in only 6 cases in the 327; 3 of these recovered. In 2 other cases diphtheritic membrane appeared, once on the ear, and once on the lip.

17 times the tracheotomy was done for croup (mostly diphtheritic in type) occurring during the course of the exanthemata, mumps, or whooping-cough. In 10 cases it was a complication of measles, and of these cases 5 recovered. A very unusual state of affairs, if we may believe Cohen,<sup>1</sup> who says, "Croup supervening on the exanthemata is not, as a rule, amenable to tracheotomy," and Settegast<sup>2</sup> says "Cases of recovery are so rare as to be mentioned individually." The other 7 cases after mumps, scarlet fever, and whooping-cough were all fatal.

The amount of nourishment taken by a patient indicated, of course, in a general way the progress of the case. The children were encouraged to take as much milk as possible, and in many cases were fed every hour. They took from 20 to 40 ounces of milk a day, 30 was a fair amount, and when a child took less than 25 it rarely recovered. Milk came out through the tube and wound in some cases, but it was no very serious matter, for in 7 cases when it was noted, 5 recovered. There were many curious complications in all these cases, but those of practical interest have already been mentioned.

The results of operation in this series of cases are above the average, in spite of the predominance of bad cases. They show that young children are especially liable to have extension of the diphtheritic process to the bronchi and lungs; in fact, that the chances are three to one that if they die they will die of suffocation. That, in Boston, tracheotomy at the hospital is most fatal at those times when diphtheria is most fatal in the whole city, and incidentally that the mortality per cent. from croup and diphtheria in the whole city vary by the month in unison. That cases with membrane in the pharynx at the time of operation are more likely to die than those where it is not present. That the mortality per cent. after tracheotomy rises steadily as the operation is done on the first, second, third, or fourth day of the difficult breathing. That nasal discharge, albuminuria, and enlargement of the cervical glands, are symptoms of less moment than the character of the discharge from the trachea tube, which is the most important index of the progress of a case, and that the recovery-rate varies nearly 50 per cent. between cases

<sup>1</sup> Cohen; Croup in its Relation to Tracheotomy. 1874.

<sup>2</sup> Settegast; Archiv für klin. Chir., xxiii. 270.



where the discharge is loose throughout and those where it is gummy at any time.

For purposes of comparison, a table of all available reported cases of tracheotomy has been constructed. As a rule, no group of less than five operations has been considered, very few contain less than ten, for the reason that recoveries predominate enormously in the very small groups. The journals are full of accounts of two or three successful cases reported by practitioners who may or may not hint at various failures in the past. It was considered that to count such groups would be misleading, and they were all rejected, whether favorable or not, because they were not considered representative. The cases are arranged by countries, and, so far as it has been possible to tell, no cases have been reported more than once.

	Total.	Recovered.	Died.	Per cent. Recovered.
German authors . . . . .	5795	1851	3944	31
German hospitals . . . . .	3063	939	2124	30
British authors . . . . .	433	138	295	31
French authors . . . . .	9242 <sup>1</sup>	2242	6834	24
Various countries . . . . .	1993	657	1336	32
American authors . . . . .	1327	308	1019	23
	21,853	6135	15,552	28

<sup>1</sup> 166 not healed.

## REVIEWS.

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THE SCIENCE AND ART OF OBSTETRICS. By THEOPHILUS PARVIN, M.D., LL.D., Professor of Obstetrics and Diseases of Women and Children in the Jefferson Medical College, Philadelphia, and one of the Obstetricians to the Philadelphia Hospital. Illustrated with two hundred and fourteen woodcuts and a colored plate. Pp. xv. 701. Philadelphia: Lea Brothers & Co., 1886.

THERE is always room for a good book. The more thoroughly beaten are the paths, the more familiar each commanding feature of the landscape, the better welcome to one that can picture anew the familiar scene, and throw upon it broader lights or bolder contrasts. But where so many know, and so many have described it, all the more difficult for one to enter upon the field. He must expect criticism. No two see the same well-known object from the same point of view. The perspective angles are all different. In the great field of gynecic literature obstetrics seems to stand still. It is not still, however. It has the advance that is made all along the line, and has seemed to move less rapidly in contrast to the brilliant progress of gyniatrics.

There is enough of the new to signalize the advent of a new book in obstetrics, and it is a graceful act in Dr. Parvin to mark his translation from his old field of work in the West to one of broader, more ardent labor in the East by an elaborate treatise upon a subject that he has made his own, and won an honorable fame.

His task has been a difficult one, and to which he must have been impelled by a higher motive than ambition. We needed the book, not in the sense of lack of quantity before the medical public from which to select, but American literature upon obstetrics is not yet rounded out and complete in all its proportions. Dr. Parvin contributes much to complete the structure, and we may now begin to say that we have upon the subject a national literature. Upon a science so broad as obstetrics it may be difficult to define how, in any sense, it can be national in character. This is no place to discuss the matter; but the literature upon that or any other subject may be of such a broad and original character as to afford a consensus of opinion that is truly national. We may go even further, and assert, without danger of inviting contradiction, that environment and social condition may exist as prime factors in modifying to a degree equal to national characteristics many of the phenomena of that science called obstetrics.

Dr. Parvin begins his treatise in the good, old classical way of grounding his readers in elementary anatomy and embryology. A departure from this order would, by some reviewers, be regarded as an innovation. but we believe that some obstetrical author of the future will thus innovate. It is perfectly proper to regard the young obstetrical reader as being in need of some special instruction concerning the female pelvis and

its contents, but one must be careful not to do the young reader harm rather than good. Dr. Parvin takes a cut from a plate by Sappey of the situation and relations of the uterus, in which the uterine axis is made to conform to the axis of the upper pelvic strait, except that the uterine fundus is slightly posterior to the line of the latter. As usual in this time-honored illustration the bladder and rectum are in a distended condition. The reader may protest against the notice of such a trifle, but it is not by any means a light matter. The mass of students and practitioners have not original and costly monographs within reach to correct an error of this sort, especially as all the text-books upon diseases of women in English, with one honorable exception, reproduce an illustration of the same general character. The reviewer well remembers that once upon a time, while giving evidence upon the stand, an unfriendly advocate held Playfair's very good book under his gaze with this same cut, or one like it, uppermost, and asked him if that was a correct illustration of the natural relation of the pelvic viscera. "No, sir, it is not," was promptly answered. "What!" with a triumphant glance at the jury, "do you differ from this distinguished English authority, and from Dr. A., and Dr. B., who have just sworn that this is a correct representation of these parts?" Surely this advocate could not be blamed, nor could Dr. A., or Dr. B. But we must confess to a certain degree of feeling toward Playfair, who knew better, and one may fancy that the well-executed woodcut in Parvin will serve the same ignoble end. Our author still further confuses his younger readers by giving an approximately correct pelvic section copied from Schultz, without a word of comment to guide the reader to a correct conclusion. The two opening chapters devoted to the subject already noticed are well illustrated, and compiled from the latest authority. We notice but one omission, and that is the correction of Hart, as to the distribution of mucous membrane upon the nymphæ and body of the clitoris, which differs materially from accepted descriptions, which independent study by others has confirmed.

The third chapter upon puberty, ovulation, and menstruation is interestingly written. At the outset our author expresses himself in a way that one choice in the use of terms would object to. Incidentally he defines menstruation as a hemorrhage from the uterus that occurs at definite times, concerning which, we all know that menstruation in its normal expression is not a hemorrhage. Justice requires us to admit that he does not use the term in its exact sense, but in an illustrative way; in other words, it is a figure of speech. While upon the use of terms it would be as well here as elsewhere, to speak of the style of our author. Nothing in the way of medical writing can be more clear or simple. Most medical writers, unless they are stricken by Hugo or Carlyle, cannot be said to have any style; but concerning our author, if we were to apply to it the standard of old Hugh Blair, simplicity is the only term to convey an idea of the directness of expression, the freedom from ornament, and the painstaking effort to avoid confusion of expression. We fail to recall an instance in the book in which he has tried to clear up a doubtful meaning by turning the idea into another expression, which is a very common fault in text-books. Another feature that will strike the reader is the careful way in which excessive technicalities have been avoided. Our author has a correct idea of a technical word. Its proper use is not to convey a meaning but to give a definite form to an expression. Its use is to limit and so direct the sense that but one con-



struction, and that sharply defined within the limits of a single word, can be placed upon the sentence. As an instance, but not specially to illustrate the last comment above, take the following :

"The physician, whose duty is not only to heal the sick, but also to prevent disease and to improve the race, and hence one (who) must be a teacher of men and women, should teach sound doctrine in regard to the injurious results of precocious marriage. Mothers especially ought to be taught, though some have learned the lesson by their own sad experience, that puberty and nubility are not equivalent terms, but stand for periods of life usually separated by some years; the one indicates capability, the other fitness for reproduction."

It would have been a blessing, not in disguise, if the text-books written according to law to teach physiology in the common schools of New York, could have been expressed in such direct and simple English. One will notice the omission of pronouns, which is almost a mannerism of the author, which seems to come from his desire to construct a sentence without a superfluous word. On the following page, what can be more simple, exact, and graphic than the following description of the *corpus luteum*?

"The ovisac—its size lessened by the escape of the ovule and its surrounding granular matter, and of serous fluid, and the rent through which these passed closing—undergoes certain changes, which result in its obliteration, the most notable of these being the formation of the *corpus luteum*, or yellow body."

Would the young reader of that ever forget the cause and nature of this little spot? Neither our author, nor the reader must put a wrong meaning upon what our sum total of his style amounts to; it is complimentary, not invidious. It is this, by way of comparison; Lusk's treatise is one for the mature practitioner; Parvin's for the student or undergraduate. Not that one is more elementary than the other, but one is better fitted by happy simplicity of expression to convey an idea,—to break the ground, as it were, in the process of education. The result is that we know of no book that comprises a greater mass of facts within seven hundred pages than the one before us.

Upon menstruation, concerning the nature of which there are some well-grounded uncertainties, if such an expression can be allowed, our author permits no liberties. If he has any pet theory of his own, he evidently regards an educational treatise as no place for its exposition. In one sense he is right, but he must not forget that he is a guide as well as an educator, and that even a word of doubt or dissent is a useful stepping-stone to the truth.

Part second opens with the subject of pregnancy, of which the first chapter is given to conception, early development of the impregnated ovule, formation of deciduous membranes, and the fetal appendages, and gives us a *résumé* of the latest theories.

The second chapter is devoted to the anatomy and physiology of the embryo. Very properly the author insists upon the distinction between *fœtus* and *embryo* which is so frequently confounded. Dr. Parvin adheres to Pajot's law concerning fetal presentation. He says:

"Studying Pajot's law as it relates to the presentation alone, we find in the painless contractions of the uterus in pregnancy, in the varying abdominal pressure, and in the changes of position of the mother, which have more or less action upon the *fœtus*, the conditions of movement and rest; the *fœtus*

presents more of a rounded than an angular surface, and after the secretions of the sebaceous glands begin, this surface is smooth, slippery, and thus the amniotic assisting, the accommodation of the contents to the container is effected. This accommodation fails in those months of pregnancy when the uterus is very much larger than the fœtus. Thus Veits's statistics show that in 247 deliveries between the first of the fifth and sixth months, the head presented in 140, the pelvis in 95, and the trunk in 12. In the fœtus be dead and macerated, one of the conditions of the law fails, the content is no longer a solid body, and statistics show that in very nearly one-half of the cases when delivery takes place before six months the pelvis presents."

Many corroborative facts can be brought to bear upon the quite general utility of Pajot's law. Presentation of the pelvis is common in the hydrocephalic fœtus and evidently in obedience to the law of accommodation. In twin pregnancies there is a defect in this, with corresponding variations in errors of position. In hydramnios the law of accommodation is violated, so that breech and lateral presentations are common.

The author refers to the discussion in the New York Obstetrical Society of fœtal narcotism secondary to that of the mother. The matter must now be regarded as beyond dispute. Porak's experiments are absolutely conclusive. In one instance in which one grain of quinine was given to the parturient woman, the urine of the child born an hour and a half afterward showed the presence of the drug. Ruige made a similar observation. If the child in utero can suffer from intermittent fever the remedy is at hand.

The third chapter is devoted to changes in the maternal organism and to multiple pregnancy. Concerning the latter, our author adheres to the possibility of super-fecundation in the human female, adducing the familiar illustration of the white woman with twins, one white, the other a mulatto; or its converse, the black woman with a white and a mulatto child. It appears to us much more reasonable to regard them as instances of atavism, which is so very common in cases of mixed blood. At least in all phenomena of this nature the contrary of mixed races must be proved before we can offer superfecundation as an explanation. The latter aberration of fecundation is no more marvellous than that of superfœtation.

The fourth chapter upon the signs and diagnosis of pregnancy is very compact, and well written with no long exposition of the various signs, and is an excellent chapter for the student. The author's MS. was so far out of his hand at this point that he evidently could not include Hegar's sign of pregnancy, one of the very last of any value.

In the fifth chapter the author enters largely into the medico-legal aspects of the duration of pregnancy, the proof of previous pregnancies, and missed labor. At the conclusion of the section he gives a summary of the legal bearings of the duration of pregnancy by James I. Baker, Esq., of Indianapolis, which is the best exposition of the subject to be found in any text-book up to the present time, not excluding even treatises on medical jurisprudence, as it is a statement of decisions in the various State courts. Mr. Baker's brief upon the subject will evidently find a permanently useful field in the literature of this vexed question.

The management of pregnancy, the pathology of the condition, and eclampsia, are the subjects of Chapters VI., VII., VIII., and IX. Relating to the latter, the author alludes to the quite recent studies of

Dolérís and Butte. They have found toxic ptomaines in the blood of eclamptics, which may cause the disease. If this view of the origin of the convulsions is confirmed by future investigations, we may put to one side the exclusive idea of renal origin. It is to be regretted that our author is so non-committal upon the treatment of eclampsia. In this grave accident the student needs an energetic guide. It is not so much a single question as to what is safe and that only, but what can be done that is not more dangerous than the disease itself? For instance, our author's most hearty approval of bloodletting is, that "the abstraction of blood gains time for the use of other therapeutic means, and prevents the consequences of congestion; the abstraction of ten to fifteen ounces of blood can only, in exceptional cases, be immediately or remotely injurious." Our friend, Dr. Clark, of Oswego, in his energetic use of morphia receives no word of favorable comment, although it is a practice that is gaining ground, and giving excellent results. The author leans to the free use of chloral, a drug that is certainly as potentially dangerous as morphia.

In Chapters X. and XI. diseases of the sexual organs and of the ovum are described. The only point necessary to call to the attention of the reader is the author's method of dealing with retained placenta after abortion at the third month. He is conservative and cautions against too active interference, quoting approvingly Churchill's conclusion, that they may be safely left to nature. There is surely no danger in proper removal of placental fragments, and the sum of opinion in this age of clean surgery, not to say midwifery, is in favor of removing all sources of septic infection. Surely, of all organs of the body, and of all material that may become incarcerated within it, no one is so prone to absorb, and nothing is so certain to decompose, as a uterus with retained fragments. That we do remove them days after the proper time for expulsion, filthy beyond description, and the woman show no evidence of blood-poisoning, is no argument to leave these cases to nature. Cases have come to the writer's knowledge in which the retained mature placenta was treated in the same Fabian method. Now, as a matter of fact, women do not often die from blood-poisoning due to decomposing placental fragments after spontaneous absorption, and it is upon this tolerance that the treatment by non-interference is based; but they do in some instances die, and there is a special liability to this result in instances of forced abortion, so that it is doubtful policy on the part of an educator to be conservative in his teaching upon this subject. If placental tissue, either in fragments or entire, is left longer than ten or twelve hours it is sure to be decomposed, the result of bacterial invasion; and the line of non-interference ought to be drawn about them as a matter of time. Dr. Parvin may be right as a teacher to deprecate the use of the curette and other instrumental interference when the case presents no evidence of danger. The method he advises, that of the finger, is a safe and efficient one, but in case the cervical canal is closed, so that the finger cannot be introduced into the uterine cavity, as it very frequently is after twenty-four hours, it is not necessary to resort to gradual dilatation, as the author advises, with tents, but rapid dilatation is safer and better, and may be almost painless with a proper instrument and gentleness in manipulation.

Chapter XII. is devoted to the study of ectopic development of the ovum and placenta. A concise but excellent summary of the symptoms



of the former condition is given. The treatment by the faradic current is assigned an important place in the treatment. It is to be regretted that more exact rules for the application of the current to arrest foetal life are not given. Garrigue's directions, that a moderate current for ten minutes at a time be employed, are of very doubtful utility. The writer has just been through an experience of this kind, and the method of Garrigues as quoted by our author would have been useless. It needs no argument to assert that the faradic electricity is used to destroy life. The fact that this life is of low grade does not imply that it will succumb to a mild form of the agent, passed for a short time. Foetal life, to illustrate, is of as active a nature as that of vegetable life, and it is known by experiment that in the majority of instances a powerful current is needed to cause fatal molecular changes in the latter. Another fact, which every one who has used faradic electricity about the female pelvis must have noticed, is the great tolerance to the current in these parts. In one instance under the observation of the writer, the full strength of a large induction coil, with a current from two zinc-carbon cells, was used with but little expression of pain from the patient. It was impossible for the operator to hold the electrodes in his hands. A secondary current of this strength was passed through the foetal cyst for an hour. Several séances of this character were had before it could be said that foetal life was destroyed.

A word as to the evidence that the current has done its work. This ought to be looked for in the cyst rather than to abatement of the rational signs of pregnancy or to retrograde changes in the breasts. The most important are lessened tension in the cyst, which is observed long before the most delicate touch can assure the operator that there is actual diminution in size. The situation and character of the cyst are such that no manner of touch can measure it, it simply leads the observer to exert a scientific imagination that the cyst is diminishing. Next, the attacks of pain ceases. This will be noticed to coincide with the lessened tension of the cyst wall, and is probably due to the relief of pressure upon tissues but little tolerant of tension, and with but scant time to acquire adjustment to the morbid change. It is to be regretted that there is no accurate method of measuring the strength of the secondary current of an induction coil; if there were, it would be a very simple matter to designate the electro-molecular force necessary to destroy foetal life in ectopic pregnancy; but in the absence of such a guide the writer would urge a strong current and a long séance.

At Part III. the author begins the study of labor. Eight concise, well-considered chapters dispose of the whole subject, which is given further value by a profusion of well-executed wood-cuts. Our author presents nothing new in the division of his subject. Abdominal palpation is well described and illustrated as it is now in all the recent handbooks. We have great faith in instruments of precision and of their influence upon the future of medical science; but it is quite an innovation on the general conservative tone of the book to have our author give the very ingenious instrument of Dr. Deaman, called a parturiometer, a very prominent place and give a few lines of comment rather unfortunately expressed. He says:

"The parturiometer indicates when it is proper to break the membranes, when the cervix is fully dilated; when the application of instruments becomes necessary."

There must certainly be something in Dr. Deaman's instrument that will cause such a statement from our author. We had supposed that in all the above indications the "when" was more or less of an intellectual process, and while instruments of this character are useful they will rather serve the purpose of exact study of phenomena than take a practical place at the bedside. Dr. Deaman contributes a page of description of his instrument which is very interesting.

The author enters fully into the subject of anæsthesia. In this period of multiplicity of agents of this character chloroform is given the chief place. It is evidently Dr. Parvin's practice to employ it, although the reader gains this idea by inference rather than directly. Chloral in the first stage of labor is mentioned, and probably serves as useful a purpose as general anæsthesia in the second. It is surprising how slowly anæsthesia in obstetrics has gained its place, and it is far from being in general use to-day. The writer must confess to having had a great reluctance in using it early in labor, and confined its use to the expulsive stage; but just before withdrawing from obstetric practice it was resorted to in every case, affording deep regret that for fifteen years he had given it but little use. It will certainly become generally employed when such a conscientious teacher as Dr. Parvin advises it.

A great variety of statements from various authors is given concerning the care of the perineum, and the student must be left in considerable doubt as to the better way; a careful reading leads to the opinion that it is the author's practice to support this part during the expulsion of the head. Chloroform is a better protection than the methods of support given in the text, as an anæsthetic prevents the energetic voluntary efforts on the part of the mother.

Immediate ligation of the cord is advised; or, at least, what the advocate of late ligation would call immediate. He says, "when the child breathes freely, and the pulsation lessens in force, one need not wait. In regard to waiting until all pulsation has ceased, one might, in some cases, wait until all patience as well as pulsation has ceased." None but the ardent advocates of late ligation can object to this. It will afford comfort to mothers and old nurses to know that the "belly band" is advised in dressing the child. It cannot possibly do any harm to apply a bandage properly to the abdomen of a newly born child, and yet it is a recent "fad" to leave it off. The binder to the mother also finds a consideration at our author's hand, and young practitioners had better follow the advice. It is a proper and comfortable article of dress, and ought to be so considered.

The chapter upon anomalies is contributed by Dr. Henry Morris, and is well written and illustrated.

The puerperal state is considered in Part IV., and is the shortest division of the book. We will omit all review of this section, except that which relates to puerperal septicæmia. Whatever may be the debt of surgery to antiseptics that of obstetrics is equally great, and a teacher of the latter must now occupy no doubtful position concerning the sources of puerperal sepsis. We can find no fault with our author in this. He speaks judiciously, but positively:

"Independently of all culture experiments and inoculations, and microscopic examinations of the uterine and vaginal discharges of sick women in childbed, and of fluids or solids of women dying of puerperal septicæmia, there are some reasons which make it very probable that the infectious agent is a

living, a *contagium animatum*, rather than any chemical substance, whether sepsis or ptomaine. These are, the very minute quantity which infects, the rapidity of its action, and, finally, the protective power of germicidal solutions. It is only upon the hypothesis of a living poison with the great rapidity of reproduction which low forms of life have, that we can readily explain the fact of dangerous illness being so soon developed. And again, if we cure by using injections of corrosive sublimate, or of carbolic acid in solution, it seems more rational to conclude that the agent has destroyed living rather than rendered dead matter harmless. Moreover, the demonstrated dependence of many other diseases upon germs makes it probable that this also has a similar cause.

"The microbes which are most constantly found in puerperal fever are chain-like micrococci, and in many cases of the disease where these were not discovered it is possible they were still present, but methods of examination failed. Similar micrococci have been found in erysipelas, scarlatina, and in diphtheria, but similarity does not prove identity, and it may be that careful culture experiments will show that which the microscope has failed to do, an essential difference in these cocci. We must remember that microbiology is still in its infancy, and the relation of microorganisms to disease only beginning to be demonstrated, and therefore we are willing to admit that the chain of evidence is not yet complete which connects puerperal fever with the action of microorganisms. Conceding this origin of the disease, are there different microbes for the different varieties of the disease? Or do differences arise from the quantity introduced, and the receptivity of the subject, and the time of introduction? A plant does not thrive equally well upon different soils, nor seeds germinate with equal rapidity in all seasons, and why not admit equal results in microbicum maladies? Scarlet fever in different epidemics and in different subjects, presents grades of intensity and degrees of danger widely separate, yet the poison is one and the disease is one. The origin of an epidemic of puerperal fever may be in a case of retained placenta where means have been employed to remove the placenta, these means failing to make the delivery complete; in a day or two the lochia become offensive, the woman has a chill followed by high temperature and increase in the frequency of the pulse. Other women are infected from this patient with different forms of puerperal fever, scarcely two presenting the same symptoms. Here then is a common cause, but various results; one fountain, but many streams.

"But what rôle do retained clots, or as in the instance just alluded to, do fragments of placenta play in the genesis of the disease? Are they innocent, so that it is a matter of indifference whether they remain in the puerperal uterus? No, for while they do not create the disease they furnish the nidus in which septic germs enter, a favorable soil for their development and multiplication.

"*Summary.*—From what is known of so-called puerperal fever it should not be regarded as a specific disease, and strictly speaking there is no puerperal fever, that which is so denominated being a febrile affection caused by the entrance into the system of a poison from without, the nature of which we do not know, the entrance taking place through a wound of the uterus, or of some part of the vulvo-vaginal canal."

No honest bacteriologist can take exception to this well-expressed summary of Dr. Parvin, or to any portion of the above. It is one of the best expositions upon the subject in any text-book, and will produce a healthful mental impression upon students and practitioners. To those who are fond of a well-turned sentence we hold the following up as one of the cleverest in medical literature. We have already quoted it, but it will bear repetition. "It seems more rational to conclude that the agent has destroyed the living rather than rendered dead matter harmless." It is the gospel of disinfection, and the whole creed of the bac-



teriologists; but it provokes the reviewer into saying that it is a great pity that a man who can express a conviction so fairly and so happily has not thrown authorities and their conflicting dogmas to the winds and become Parvin himself from cover to cover, as he was so well able to do. When will some American treat the subject of obstetrics as Emmet has that of gynecology, and not like Lusk, who has written the best German work on obstetrics in the English language, or like one not yet upon the shelves of our library, which is the best digest upon the subject up to date.

We are not yet through with our author upon the subject of antiseptic midwifery. Now with the author's clearly expressed views upon the subject of puerperal infection before us, we are prepared to say that prevention is of much greater utility than treatment. In fact, what physician has not the misfortune of knowing how useless are some, if not all, of the best laid plans of medication, and even disinfection, in the presence of this disease? We have seen how fully in line with the most advanced writers Dr. Parvin is upon the subject of antiseptic midwifery; but as in this practical part of his treatise we have to consider methods not opinions, let us inquire how perfect are his methods for the protection of the lying-in woman. Turning back to his chapter upon the conduct of labor the author says:

"Thorough disinfection of the room which the patient is to occupy should be made, if it has been previously occupied by one suffering with scarlet fever, with erysipelas or diphtheria, or with any disease attended with suppuration, as uterine cancer in its advanced stages; it would be better, indeed, for her lying-in to be in another house, or other room. The room, too, should be free from the effluvia of decaying animal matter. If there be any sewer communication in it, as, for example, from the permanent wash-stand, that communication should be for the time, at least, cut off. The obstetrician must know that the nurse has not recently been in attendance upon any of the forms of disease that have been mentioned and especially upon a case of puerperal septicæmia."

This is all very well and no possible exception can be taken to it so far as it goes; but the best comment we can make upon it is to quote from a recent paper by Prof. William D. Richardson, of Harvard, published in the *Boston Medical and Surgical Journal* for January, 1887. He is writing upon the use of antiseptics in obstetrics, as illustrated in the Boston Lying-in Hospital:

"The various changes which have been in the attempts to rid the hospital of septicæmia, have been the results of careful study and observation on the part of the visiting physicians, and after many anxious consultations on the subject. As one septic case occurred after another, every effort was made to avoid any possibility of contagion from a patient presenting symptoms of septic infection to another. Isolation of suspected cases; the employment of extra and special nurses, the assignment of different house-physicians to the infected, and to those whose convalescence seemed normal; the use of every possible precaution to insure cleanliness, the providing of individual bed-pans, syringes, etc., constant attention to ventilation and improvement in the drainage, were among the methods adopted. Many of these changes seemed to promise improvement, which, however, was always found to be temporary. From the very outset the staff were a unit in the belief, even then not generally accepted, that the views of Semmelweis were correct, and our object was to prevent the entrance of septic material from without, and the prevention of the absorption of septic material originating within the uterus and generative tract. With this latter end in view, we soon began the use of vaginal injections,

hoping to keep disinfected those parts especially exposed to the lochial discharge, which seemed to us one great source of danger within the patient herself. These were subsequently not infrequently combined with intra-uterine injections, hoping thereby also to render innocuous the clots and placental débris within the uterine cavity. All these attempts proved futile, although occasionally it did seem as though some new method of procedure which we adopted was at last to offer the long sought for relief. The respite was, however, only temporary, and still the mischief went on.

"In the middle of the winter of 1883 and 1884, corrosive sublimate was first tried, not only as a vaginal douche but also for the disinfecting of the hands of the attendants. A very decided improvement followed this method of procedure, and again the outlook was more cheering. Still septicæmia remained with us, but in a more modified form and the death-rate fell decidedly. Then came the announcement of Robert Koch's investigations of bacteria, and . . . we determined to change our whole system."

We will now return to our author and continue the quotation from the next paragraph to the last on the conduct of labor.

"It is well for the parturient to take a warm bath at the beginning of labor, and afterward to have the external genital organs washed with a two or three per cent. solution of carbolic acid; when the labor is protracted, a similar solution may be used as a vaginal injection once or oftener. A three to five per cent. solution may be used by the physician, and by the nurse for washing their hands. The former not only should use an antiseptic solution in which he washes his hands before each examination, but also an antiseptic ointment applied to the fingers before introduction into the vagina; this may be carbolyzed cosmoline, or iodoform and cosmoline, or an ointment may be made by incorporating with an ounce of cosmoline, one-tenth part of thymol."

As the latest expression upon this vastly important subject of antiseptics in labor, and to contrast the very material difference in methods, we will introduce one more extract from Prof. Richardson. It relates solely to the conduct of labor.

"In every case the genital and surrounding parts are washed with a solution of bichloride of mercury ( $\frac{1}{3000}$ ). A basin containing the same solution and a nail-brush is placed on a stand by the side of the bed. The physician and nurse in attendance disinfect their hands every time they have occasion to examine the patient or touch the neighborhood of the vulva. The examining finger is smeared with an ointment made of one part of the oil of eucalyptus and seven parts of vaseline. A vaginal injection of the corrosive sublimate solution is given at the beginning of labor, and this is repeated when circumstances permit at the end of the first stage. As the head distends the perineum and is expelled the parts are kept clean by the use of charpie dipped in the mercurial solution. After the birth of the child, no undue haste is made to bring about the expulsion of the placenta. This is effected, if possible, by Credé's method of expression, great care being taken not to introduce the hand within the vulva, if such a procedure can be avoided. The original injection is repeated, and the antiseptic pad is applied."

It is by such means as the above that the dark picture of septic infection has been changed and lighted up. It proves that infection comes from without; that its introduction can be prevented, and that, as a prophylaxis, it is as complete as vaccination is to smallpox. Contrasting the two extracts, it shows that our author is right, and that he believes in the best teachings of the bacteriologists; but his methods are doubtful. A two or three per cent. solution of carbolic acid has been demonstrated to have no more value as a germicide than clean water.

But we do not bring this up as a critical matter. Our author is treating antiseptic midwifery, and anything that would lead the student or practitioner into the false security of half measures is a fault equally as great as not to teach it at all. This is a practical matter. Opinion has nothing to do with it. Demonstration has made it clear as the sun at noon-day, and it is therefore a question of methods, and those methods by which the most perfect results have been attained are those which ought to be taught. The opinion that one may have, that one procedure is as good as another, has nothing to do with it if the two methods have not been put to equal tests. There is a certain moral responsibility in teaching that reaches such a high level that one may try in vain to attain it by the force of opinion. He reaches this altitude by facts, surrounds himself with them as with an atmosphere, and lifts up to his own level all who follow after.

The author resumes the subject of antiseptics in describing the treatment of puerperal septicaemia in which further prophylactic measures are followed in the convalescence, while his remedial measures are of an active antiseptic nature, and in all of which he is in accord with the best teachings. In all that has been said of a critical character above we wish in no way to detract from the real value of this important section of his book. In fact, it may be said to be in advance of any recent text-book; but since the latest American text-book very material advances have been made upon this subject, and the practitioner to be properly instructed should have a practical knowledge of the best methods of maternities in order to judge how perfect he must make his antiseptic details at the bedside.

The fifth and concluding part is devoted to obstetric operations, beginning with the induction of abortion, premature labor, and turning. The latter is presented in accordance with the precepts of Dr. Samuel Sloan. The instructions as to turning are very simple and practical, and will serve to do away with the fears of the young practitioner lest he gets hold of the wrong foot.

The forceps are studied in the second chapter. There is a well written history of the instrument, illustrated with cuts of the older and later forms, followed by the theory of the forceps and the mechanical principles involved in their application as levers, tractors, and rotators. Chapter VIII. disposes of the indications for the application of the forceps and the rules governing their use in general, followed by special instructions in different presentations and positions. This chapter is one of the most practical in the book, and too much praise cannot be awarded the author for the simple and clear manner in which this usually difficult subject is disposed of. The application of the forceps is so simply and clearly described that the least learned practitioner can understand it. It is not always so, as a very recent instance will show, in which a New York reviewer got so tangled up with his author that he could not understand whether he meant the right or left thigh of the mother, or his own right or left hand. We read and reviewed the same description and thought it a very good one; but as the reviewer was a very learned man, we always thought it was stupid on our part not to confess to an equal degree of confusion.

Chapters IV. and V. conclude the book, and are devoted to the subjects of Embryotomy and the Cæsarean operation and its substitutes. The latter will alone detain us. At the opening of the chapter we are



startled by a table compiled by Dr. Harris showing the strange fatality attending this operation in the United States; no mothers saved here, while in Germany, 84 per cent. of the mothers were saved (25 operations, 4 deaths), in the past year.

"Leopold operated for the tenth time in June, 1886. This gives him the loss of one woman in ten, or from his hospital, a saving of ten women and three children from eleven operations. Now if such success could be obtained by practitioners generally, craniotomy upon the living fœtus would soon become unknown."

It is not a little singular that after various improvements in the operation, we have as the best method of operating, returned to the so called improved Cæsarean operation, which is the old way of operating, nothing more. It is simply done more carefully, with more hope in it. In one operation, we remember hearing one of the physicians present urge the operator to take less time to clean the abdominal cavity as the woman would die any way; and that seems to be the spirit in which the operation is often made. Now, the improved operation, as described by our author, who follows Potacki, is simply the old operation made with more care, as to suturing the uterine wound and antiseptic precautions.

Porro operation and the Porro-Müller modification are next considered, and contrasted with the Cæsarean. Up to 1885 it does not offer as good results to mother and child as the latter.

"Up to March, 1885, fifty per cent. of the mothers recovered after the Müller modification, and forty-four per cent. after the unmodified Porro." "There are," the author continues, notwithstanding this greater success of the Cæsarean operation, "instances in which the Porro or the Porro-Müller would seem to promise the greatest success. When, through unwarranted delay, or by reason of unwarranted attempts at delivery the uterine tissues have been seriously injured; or when the child is putrid, or when the patient is greatly exhausted with incipient or established septicæmia, the amputation of the uterus and its appendages by the Müller method would seem preferable to the Cæsarean section; again, when there is extensive fibroid or fibro-cystic degeneration of the uterine body, an amputation at the neck would be indicated. Whenever there is especial reason to fear septicæmia, the Müller modification should be preferred to the Cæsarean section without amputation."

It is difficult to understand why in case of septicæmia Müller's method should offer better chances when we consider that the chief cause of death after Porro was from blood poisoning, while exhaustion has been the most frequent cause of death after Cæsarean section.

Gastro-elytrotomy is given a short notice with a valuable historical paragraph. Dr. Parvin says:

"Even if the general success of the operation could be made equal to that which Skene has had, saving three mothers and three children in four operations, this by no means equals that which may be hoped for from the improved Cæsarean operation. Moreover, gastro-elytrotomy is impossible in many cases in which the other method of delivery can be employed. Its performance is liable to cause injury of the bladder, and it is followed by prolonged suppuration."

A brief notice of the Cæsarean section in post-mortem delivery closes the volume.

We have reviewed the book of one whom we know; we know his thorough conversance with his subject; we know the thoughtfulness of

the man, and we know if he had stripped himself of his allegiance to authority and written from his own ripe experience, told in the terse and simple manner of the book before us, he would have produced a better book; not better in the sense of a teacher, but better in the sense of individuality, that pervading spirit within the covers of a book that makes it live for itself and the glory of its author. It is one thing to be a teacher; it is another thing to form opinion for those who come after us. One must elect which he will be. It is a ripe harvest that Dr. Parvin offers to his readers. We are satisfied with his labors, and he has done well. He has elected to be a teacher and as such he has followed in the steps of those who have gone before. He has crystallized the thought that has ripened; he has been a gleaner but has planted no seed for the harvest of the future. But the gleaner has his use as well as the sower of seed and without him there would be an end to all progress. It has been said that one who invents a new flavor is greater than he who captures a city, but how much greater is one who sets all after-coming men thinking.

There is no book that can be more safely recommended to the student or that can be turned to in moments of doubt with greater assurance of aid, as it is a liberal digest of safe counsel that has been patiently gathered.

E. V. DE W.

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DISEASES OF THE JOINTS. By HOWARD MARSH, F.R.C.S., Senior Assistant Surgeon to, and Lecturer on Anatomy at St. Bartholomew's Hospital, Senior Surgeon to the Hospital for Sick Children, and to the Alexandra Hospital for Hip Disease. 12mo. pp. 460. Philadelphia: Lea Brothers & Co., 1886.

AFTER briefly adverting to the history of joint surgery and demonstrating how it has fully kept pace with the rest of the art, Mr. Marsh shows that this advance has been chiefly due to the gradually increasing recognition of the efficiency of prolonged rest in staying the progress of even scrofulous joint disease, and to the application of the principles of aseptic surgery, which latterly "has produced results which can scarcely be exaggerated in the management of suppuration in joint disease. It is now well known that matter, whether connected with acute or chronic arthritis, may be safely evacuated, with the result that the severe suffering, the prolonged fever, the wide and destructive burrowing, and the formation of sinuses, which were the common rule only a few years ago, can be generally avoided. These results are more far reaching than at first sight they appear to be; for when disease can thus be checked at the outset, and when, should suppuration occur, the complications formerly so constantly met with in connection with large collections of matter can be averted, diseases of the joints become in their whole aspect much less formidable, they extend over much shorter periods, they lead to no material deformity, they cause comparatively little suffering, they inflict but little injury on the general health, while such mutilations as excision and amputation are falling more and more into disuse."

These sentences epitomize the author's theory and practice in the treatment of all forms of joint disease, with, of course, certain minor

details, which, when examined, prove only to be modifications—not contradictions—of these rules. Admirable as rest is, beyond all question as are the advantages of, nay necessities for aseptic surgery, yet our experience has taught us, that with every advantage on our side, there yet remain more cases rebellious to perfect rest from their outset than Mr. Marsh is willing to confess.

We shall quote further on some of his extreme views as to the possibilities of rest in all cases, if commenced as soon as joint symptoms appear, and persevered in for years; but in passing we must protest against the teaching—while fully believing in the paramount advantage of rest—that only the very rarest exceptions to the rule of cure will result, if Mr. Marsh's plan be pursued, since this is a most dangerous doctrine both for patient and surgeon: for the former, since he loses faith and unfairly blames his attendant; for the latter, because it lays him open to a prosecution for malpractice.

Mr. Marsh does not believe that all strumous affections are tuberculous because, apparently, of the absence of tubercle bacilli in some cases, ignoring the results obtained both experimentally and clinically by some of the French observers with these non-bacillous cases.

Again—and here most correctly—he points out that joint cases which occur in patients with strumous tendencies are often not spontaneous, but have been lighted up by a traumatism without which no trouble would have occurred, while a mere chronic joint trouble with destructive tendencies is no proof whatever of struma, but is in many cases due to the alleged traumatism from which it started, plus want of proper treatment by rest, etc. All this we cordially endorse. On the other hand, he also apparently believes that there are a certain number of patients whose affections are solely due to the deposit of tubercular products in their osseous or articular tissues.

Holding such views, excisions of joints and amputations of limbs for the prevention of a generalized tuberculosis are only mentioned to be declared unworthy of consideration. Unlike so many of our more pretentious works, this one has been written by a surgeon of ripe experience in special fields, so that we hesitate to differ from him, and yet, do not modern theory, practice, and experience all teach very much to the contrary? Of course, there are exceptions; but according to our view the exceptions are reversed—*i. e.*, what are Mr. Marsh's exceptions we are inclined to think rules, while his rules—with respect to struma, be it understood—we consider exceptions. Perhaps this is too broadly stated, but it approximates the truth.

Mr. Bowlby is credited with the pathological portion of the work, his descriptions having been adopted by Mr. Marsh. In the main, the brief descriptions given are good, but who is responsible for the following extraordinary pathological fact? "The bloodvessels dilate, *fresh capillaries are formed*, the blood-stream is at first accelerated, but soon stasis in many places ensues" (the italics are ours)! Nothing is more certain in pathology than that new bloodvessels do not form at the stage when the blood-current is accelerated, the bloodvessels next dilating, and stasis is only incipient. What the author probably means is, that first there is either contraction followed by dilatation, or primary dilatation of the vessels with accelerated flow, then stasis, then migration of cells, during which preformed capillaries dilate so as to admit so much red blood as to become distinctly visible, and then, perhaps, the formation of new blood-



vessels *does* take place, provided cell migration and proliferation advance to the point of forming false membranes or granulation tissue. Equally pertinent criticisms might be made of other pathological statements. We think that either Mr. Bowlby should have been solely responsible, or that Mr. Marsh should have expressed some positive opinion as to his own views, and not have cautiously alluded to all the views held, in the compass of a few lines, and then have left the reader to his conclusions, which must be vague indeed when drawn from such premises.

Speaking of acute synovitis, the advice is given to retain the limb in the position into which the disease has brought it by well-fitting splints for a few days, after which, the rest having removed the muscular rigidity, the limb will naturally subside into a good position. We are glad—while not objecting to the operation—to see that the author warns his readers that aspiration of a joint acutely inflamed is not “devoid of risk.” Blisters are highly spoken of throughout the work, but no caution is given against their application over superficial joints. Thus, on either side of the patella between the skin and synovial membrane *very* little tissue exists, and counter-irritation is too often a misnomer, since epispastics, especially if allowed to remain too long, *directly* irritate the synovial membrane. Irritation of the vascular areas *above* and *below* a superficial joint is the better practice, while even the formation of an eschar may be beneficial over a deep-seated joint, as the hip: this is our practice, and general experience has demonstrated its value.

The general impression of the hopelessness of saving a movable joint or even life when acute suppurative arthritis of a large joint occurs is combated, and we are glad to see that the author has proved by results what we have ourselves demonstrated, that free incisions, drainage, and aseptic dressings will often save life and at times a useful joint.

The section on gout should be most carefully read by the American practitioner, who, in general, seems to be possessed by two erroneous impressions, viz., that gout affects only the smaller joints in a first attack; that nothing but port wine and high living can produce gout; and that, in consequence, the disease must be *very* rare here, ignoring the fact that malt liquors in large quantity in those who use but little exercise will develop the disease *de novo*, all the more so if there be hereditary taint. We frequently see the evil effects of this wilful blindness as to the prevalence of latent and at times frank gout in this country.

Again, in rheumatic fever, should suppuration occur, at once the practitioner thinks he has made a mistake and that the disease was pyæmia all along. This may be the true explanation, but when only one joint suppurates the original diagnosis is probably correct. Rheumatic joints are also too commonly considered so safe against displacement as to be unworthy of any special care, but Mr. Marsh avers that in the knee, wrist, and ankle, there is decided risk of displacement and deformity when the disease is persistent.

In an excellent chapter on so-called “Osteo-arthritis,” the author shows by a series of brief but admirable pen sketches, that the condition called by former authors rheumatic gout, chronic rheumatic arthritis, arthritis deformans, etc., and now termed osteo-arthritis, is not a unity but a number of differing diseases which merely present certain resemblances as the ultimate result of their morbid processes. Mr. Marsh uses the term osteo-arthritis as a convenient general heading for a group of diseases characterized by a generally chronic, steadily pro-

gressing, painful stiffening, enlargement and distortion of the joints, with destruction of the cartilages, ligaments, and surrounding tendons, osteophytic formations at the articular edges and sometimes in the remains of neighboring tendons. Pathologically consisting of no less than seven different groups, in general terms it is either purely a degenerative change, "or a degenerative process to which a variable but limited degree of inflammatory action is superadded." Although generally chronic, there is an acute form which closely simulates acute rheumatism, although without the profuse sweatings and tendency to acute endo- and pericarditis, but which may in a few weeks seriously damage many joints. In addition, there is another rare form which attacks young subjects—even so young as two and a half years. As there are in reality so many different diseases grouped under this one head, so is the treatment various; but for details we must refer the reader to the original. Hydrarthrosis is looked upon as probably the result of ill-marked osteo-arthritis, and the important fact is emphasized that when bursal enlargement occurs in connection with hydrarthrosis, the bursal sacs commonly open into the joint cavity.

From an extended but excellent chapter on "Charcot's Disease," we shall quote but one sentence: "It is certainly necessary, without falling into the absurdity of finding Charcot's disease in every case of osteo-arthritis, to be on the watch in obscure examples of disease attacking a single joint, especially if the articulation is free from pain, although the seat of advancing deformity, for the occurrence of ataxic symptoms."

The author's views concerning scrofulous diseases have been already referred to and it now only remains to quote a few sentences. "The estimate of their gravity is often formed partly from tradition, partly from what is seen in the wards and out-patient rooms of hospitals, where every day children are admitted whose joints have undergone complete disorganization." . . . "Such cases as these, however, convey a highly exaggerated impression of the intractable nature of these affections." It must be remembered that a disease of inflammatory character is very much what it is allowed to become." . . . "In their incipient period these affections are, to a degree which some appear unable to credit, amenable to the influence of appropriate treatment." . . . "The presence of amyloid disease in its early stage is no bar to operative interference, even although the urine may contain a considerable amount of albumen." Rest, prolonged for years if necessary and—until the very last—in the horizontal posture, is the treatment advocated, there being no risk, so maintains Mr. Marsh, that the joint will be rendered stiff by the rest alone. As to this latter point we are in perfect accord with the author.

"Epiphysitis and Acute Arthritis of Infants" form the subjects for an interesting and instructive chapter. "Quiet Disease" is next treated of, wherein it is stated that instances "are not rarely seen in children between four and twelve, in whom the shoulder-joint is found to have become stiff, though none of the other signs of disease have been observed." So with other joints. These cases are apt to be confounded, in their early stages, with cases of muscular rigidity following injury, all the more so because at first under an anæsthetic the joint moves freely and smoothly. "In the hip all the usual symptoms, except stiffness, may be so entirely absent that for many months no suspicion of the real state of the case is excited."

Complete rest for months is the only treatment, and in many cases the

joints will ultimately recover with good motion. In some cases, however, rapid ankylosis sets in, and these are the cases which have given rise to the idea that joints kept at rest become ankylosed, but this is the marked exception even in "Quiet Disease." Syphilitic diseases of joints, the joints in hæmophilia, diseases of bursæ, and the formation of cysts in connection with the joints, are all sufficiently fully treated of. Loose bodies in joints are elaborately discussed and operative interference with antiseptic precautions is advised, with the pertinent remark "that the statistics of fifty years ago have no bearing whatever on the practice of the present day."

Internal derangement of the knee and other joints is shown to be far more frequent than is commonly supposed. When dealing with a case where the injury which has produced the displacement is severe enough to cause also acute synovitis, or where the displacement has produced the latter complication, caution is requisite lest the luxation of the cartilage be overlooked, and the stiffness remaining after the inflammation has subsided be attributed to this cause. Where the slipping of the cartilage becomes inveterate two varieties of clamps are figured which are notably efficient, but do not interfere with walking. Reference is made to Prof. Kocher's description of what he terms *meniscitis fungosa*, or fungous enlargement of the internal meniscus of the knee-joint; removal by operation is all that is available in such cases. Much interesting matter is contained in the chapters on "Bone-setting," and "Congenital Dislocation of the Hip," but no comments will be made except the statement that the author seems to show conclusively that slight varieties of congenital hip luxation often exist which are either overlooked or mistaken for some other trouble.

An able chapter is devoted to the "Prejudicial Effects of Intra-articular Pressure and on the Danger of Producing it by Surgical Appliances." It will perhaps be difficult for the reviewer to make plain that which the author demonstrates so well by means of a few diagrams, but the subject is of too much importance to be passed over. The author conclusively demonstrates, that while extension by weight and pulley in a perfectly extended hip or knee will *remove* intra-articular pressure, yet if the leg be flexed upon the thigh or the thigh upon the pelvis, by the spasmodically contracted hamstring muscles in the former and the ilio-psoas muscle in the latter, these structures at once become fulcra and the articular surfaces are brought into abnormally close contact by leverage of the second order. For this reason extension should, at first, be always made in the *direction of deformity*, and gradually, in the course of a few weeks, the line of traction may be changed as the irritated muscles relax, until the knee or hip is perfectly extended. The practitioner would do well to consult this chapter, which, to our mind, seems the one most pregnant with good results.

The chapters on nervous mimicry and tumors of joints, while up to the average, demand no special notice.

In fibrous ankylosis after strumous disease emphatic warning is given against the attempt to restore movement, a most fatal error, which we think must have now fallen into almost total disuse, since it has been almost universally discountenanced of late years. Two omissions we regret to see in the advice concerning breaking of fibrous ankylosis, viz., the advisability of perfect quiet for a few days, the immediate application of an elastic bandage, or elastic pressure by compressed sponge, and



the use of dry cold when the operation is a severe one, for in this way much can be done with perfect safety and much utility; and that dislocation of the head of the tibia backward may be partly or entirely prevented, when attempting to straighten a contracted knee by subcutaneous division with a tenotome of the anterior, or even both crucial ligaments, a practice—following the lead of a well-known surgeon—which we have long advocated and seen prove successful: the patella may likewise be dissected off subcutaneously when adherent. Of course, strict antiseptic precautions must be exercised.

Mr. Marsh contends that we must entirely revise our ideas as to excision for strumous disease, that the statistics of even ten years back are in many instances obsolete, that excision is now comparatively not dangerous, that strumous disease both by conservative and operative treatment has alike only about ten per cent. of mortality, allowing the widest margin; that "excision under favorable conditions can be, and had better be, avoided;" that "recovery will, as a rule, except in very advanced disease, be secured by rest;" and, finally, he believes "that in the future excision will fall more and more into disuse, as the treatment by rest gradually wins its way." While by no means a pessimist, we can hardly feel justified in indulging in such roseate visions, when we reflect upon the perversity and unwillingness to submit to restraint for lengthened periods shown by the average patient or parent.

Excision of the shoulder is said to be, "on the whole, deservedly unpopular," an opinion from which we most positively dissent. In excising the elbow, to gain a flexible joint, the rule is given that the ends of the bones should present an interval between them of at least half an inch when put up in the splints. Excisions of the other joints are viewed very unfavorably, being really advised only for the removal of deformity in the case of the knee, or for deformity plus extensive suppuration in the hip. Diseases of the different articulations are elaborately, and we think well treated of in the remainder of the book, but from what has already been said little remains for us to call the attention of our readers to, since the details differ in no material respects from those of other standard works.

We wish that experience in our own practice or in that of our friends could induce us to agree with Mr. Marsh in his favorable views as to the mortality and after-condition of cases of strumous knee and hip disease. Thus, in the knee, recovery may "be confidently anticipated except in a few cases in which the disease proves to be more than commonly destructive." For the hip, he says: "In cases that are detected early and adequately treated perfect recovery, with complete restoration of movement, may often be obtained. In many others the only appreciable defect is a slight limp, due either to loss of free movement, to reflex atrophy of the muscles, or to slightly arrested growth of the limb. Even in instances in which disease has produced faulty position and suppuration, the treatment by rest continued for a year or for a still longer period, and combined with extension to correct distortion, and with the early evacuation of pus will often enable children to recover without deformity, with almost perfect movement in the joint, and with scarcely a limp." Surely this is a most exaggerated statement of the facts.

Although we have seen fit to differ from Mr. Marsh both on theoretical and practical grounds in some few instances, yet we regard the

book as excellent, and one the writing of which will redound to the credit of the author. This, like all the other clinical manuals issued by this firm, possesses one preëminent advantage, viz., that, however much the views of the authors may differ from those we, or others, hold, the opinions are enunciated by those who have been taught by extensive experience, and not by ambitious writers, who, desirous of the name author, are too often evidently first becoming acquainted with their subject when studying the literature relating to it. C. B. N.

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RECENT WORKS ON THE TREATMENT OF THE INSANE.

1. THE CURABILITY OF INSANITY: A SERIES OF STUDIES. By PLINY EARLE, A.M., M.D., Late Superintendent of the State Lunatic Hospital, at Northampton, Massachusetts, etc. 8vo. pp. 232. Philadelphia: J. B. Lippincott Company, 1887.
2. THE PRIVATE TREATMENT OF THE INSANE AS SINGLE PATIENTS. By EDWARD EAST, M.R.C.S., L.S.A., Member of the Medico-Psychological Association. 12mo. pp. 68. London: J. & A. Churchill, 1886.
3. INSANITY AND ALLIED NEUROSES: PRACTICAL AND CLINICAL. By GEORGE H. SAVAGE, M.D., M.R.C.P., Physician and Superintendent of Bethlem Royal Hospital, etc. 12mo. pp. viii. 544, with 19 illustrations. Philadelphia: Henry C. Lea's Son & Co., 1884.

1. DR. EARLE, one of two survivors of thirteen physicians who founded the Association of Superintendents of American Institutions for the Insane, has presented in this volume a series of "studies" on the curability of insanity. Connected as he has been as a medical officer with one asylum, as a medical superintendent of two asylums and with the literature of insanity for a period of more than forty years, whatever he may state at the close of a long and honorable service is entitled to respectful consideration. The purpose of the author is to correct erroneous impressions that might be drawn from the earlier reports of American asylums of the curability of insanity, and to ascertain the results which more extended experience has since established. In this direction the author may be said to have done an excellent work, and to have presented a successful and exhaustive arraignment and impeachment of earlier reported asylum results.

The book comprises eight so-called "studies," which have been read before the New England Psychological Society, or have appeared in the annual reports of the Northampton (Mass.) Hospital. "They have thus been an important agent in stimulating the minds of philanthropists to seek—and in several notable instances to adopt—other methods for the custody and care of a large part of the insane than that of collecting them in expensive and unwieldy curative institutions."

In 1820, Dr. Burrows, of England, reported the proportion of recoveries of all cases treated by him, 81 in 100; of recent cases, 91 in 100. In 1826-27, Dr. Todd, of the Retreat, Hartford, reported that of twenty-eight recent cases twenty-five recovered, equal to eighty-nine per cent.

Dr. Woodward, of the Worcester, Massachusetts, Asylum, says in 1837, "per cent. of recent cases discharged recovered, of less duration than one year, eighty-nine, and in his report in 1841, ninety one per cent. recovered." Dr. Galt, of Virginia, reported in 1842 an equal result, and that the West might not be outdone, or charged with doing its scientific work on a contracted scale, Dr. Awl, of Ohio, in 1843, "unpretentiously reported" his achievements of one year, as follows: "per cent. of recoveries on all recent cases discharged, one hundred." Dr. Earle in a report of the Bloomingdale Asylum for 1844, states that "when the proper remedial measures are adopted in the early stages of the disorder, no less than eighty of every hundred are cured."

Since the "summit of the maximum wave of the highest possible high-water point was gained" in the record of cures, there has been a steady decline of the per cent. of reported recoveries. Dr. Earle devotes a chapter to the "ebbing tide" to explain in part the sources of error in the early hospital reports in this and other countries, and to present some conclusions as to the curability of insanity. It is shown:

"1. The reported recoveries from insanity are increased to an important extent by repeated recoveries from the periodic or recurrent form of the disease in the same person; and consequently,

"2. The recoveries of *persons* are much less numerous than the recoveries of *patients* or *cases*; and, consequently,

"3. From the number of reported recoveries of *cases* or *patients*, it is generally impossible to ascertain the number of *persons* who recovered.

"4. The large proportion of recoveries formerly reported was often based on the number of *patients discharged*, instead of the number *admitted*, and *generally*, upon the results in a number of cases too small to entitle the deduction therefrom of a general formula of scientific truth; and those proportions were evidently increased by that zeal and rivalry which frequently characterize the earlier periods of a great philanthropic enterprise."

To illustrate, the data from which Dr. Earle has drawn his deductions are furnished from an analysis of the operations of the Friends' Asylum, by Dr. Worthington, and reports of other asylums. One thousand and sixty-one recent *cases* were admitted into the Friends' Asylum during a period of fifty-nine years of which sixty-five per cent. recovered, but these *cases* were not *persons* and eighty-seven of the persons recovered two hundred and seventy-five times, or one hundred and eighty-seven times more than the number of persons. At the Hartford Retreat five persons furnished fifty-four recoveries; at the Bloomingdale Asylum five persons furnished eighty-five recoveries; at the Worcester Hospital two sex groups of five each one hundred and thirty-six recoveries; and in one other hospital one person furnished thirty-four recoveries. While these are probably extreme illustrations, it appears on examination that of 11,000 cases admitted into the Worcester Hospital, the number of persons was only 8204, and a similar result might probably be shown in the statistics of other hospitals.

Turning to a later period, the author, in the concluding chapter, proposes to show the results of treatment in a large number of foreign and domestic institutions, bringing our knowledge to a recent date, and presents what may be considered the hospital work accomplished at the present day. For this purpose he uses the statistics of forty-six English and Scotch asylums from 1872 to 1882 inclusive, published by T. P. Chapman, England, in the *Journal of Mental Science* for July, 1884. The



collection embraces 93,543 cases, of which 35,468, or 37.9 per cent. of the whole number of admissions, recovered.

Considered with reference to the duration of less than one year 69,983 cases are classified as follows :

First attack, less than three months,	38,283	Recoveries, 18,654	Per cent. 48.72
“ “ three to twelve months,	12,126	“ 3,421	“ 28.21
Not first attack, less than twelve months,	19,574	“ 10,494	“ 53.61
Totals,	69,983	32,569	43.51

The American result is ascertained by taking the recoveries reported at twenty hospitals at three periods of their existence, viz., the first five year period dating from the opening of the asylum; the second five year period begins with 1871; and the third period of five years begins with 1880.

Aggregate admissions first period,	14,516	Recoveries, 6,689	Per cent., 46.08
“ “ second period,	24,383	“ 8,354	“ 34.26
“ “ third period,	23,052	“ 6,896	“ 29.91
Whole number,	61,951	“ 21,939	“ 36.71

At fifty-eight American institutions the whole number of patients admitted in one year, 1884, was 14,372, of which 27.88 per cent. recovered.

Dr. Earle has done a good work in his successful effort to point out sources of error in the statistics of insanity which appear to have had their origin in the New England States, and with his early contemporaries. For more than twenty years, however, they have been recognized and avoided by the leading hospitals of the country. While the per cent. of reported recoveries has been steadily declining, the fact might have been properly ascribed to a limited knowledge of the nature of insanity that existed at an earlier day; to preference in admission given to recent cases and exclusion of chronic cases; to the increased number of hospitals at the present day, and the distribution of the limited number of recent cases among a larger number of asylums; the retention of chronic cases in the asylums to a greater extent than ever before, and not to a decline in the means or skill in the treatment of the insane. As a matter of fact, never in the history of the care of the insane were they treated in a more enlightened and humane manner, or with more knowledge and intelligence. We may go even further and express the conviction that recent cases of the present day are more successfully treated than at any previous period. A perusal of the book may tend to a pessimistic view of the whole subject, yet such an impression was hardly intended to be conveyed by the author. We must accept his purpose to furnish an argument sustained by statistics which he believes has already “caused a very important change in the statistical methods of Massachusetts, in this country, Great Britain, and in Europe.”

2. Mr. East assumes that treatment in the patient's own home will be first attempted, “but, as a rule, will fail because of the many familiar ways and habits of the home, where the patient has been accustomed to command, and to do as he pleases,” and concedes that if the patient is not so ill as to be confined to one room it is generally best to intrust him to the care of a medical man in a house with trained attendants selected by him, which is to be understood as the author's plan for the private treatment of the insane.

Several reasons are furnished for preferring the private method of treating cases of unsound mind :

"First, greater secrecy ; second, the stigma of having been an inmate of an asylum is obviated ; thirdly, patients recover quite as satisfactorily and more quickly if not compelled to mix with others similarly afflicted ; fourthly, the exercise of a little care will, in many instances, insure the return of the patient to his home without any of his acquaintances becoming aware of the reasons that have led to his absence ; fifthly, that each case receives more individual attention at the hands of the medical man and attendants employed, and there is a better chance of his getting the exact treatment suitable to his case, a practical impossibility in an institution numbering its patients by hundreds."

If for any reason the patient is not a suitable case for private treatment, the author prefers an excellent hospital for the insane to a private asylum.

Strangely enough, none of the reasons presented seem to have been founded on the results of professional experience definitely ascertained. They are rather a concession and deference to the private feelings and interests of the friends of patients which naturally exist, and to ill-founded traditional prejudice against established hospitals prevalent in the public mind. The chapters devoted to "Selection of Attendants," "Treatment," and "Tact," contain no suggestions which are not, or may not be, as well or better carried out in organized hospitals with a larger plant and resources, than any system of private treatment can afford. If, as is alleged, the insane person may awaken to reason and be shocked to find himself surrounded by the insane in a hospital, so it may be supposed he may awaken to find himself in a strange house surrounded by strangers, a close prisoner perhaps without the warrant or sanction of law. Both of these supposed awakenings may, however, be regarded as extremely hypothetical, as all experience shows that changes are usually gradual and not sudden.

The detention of insane persons, singly, in private houses is a responsibility that may be intrusted to a very limited number of persons without risk of abuse. Yet experience has shown that it is wiser and safer for all concerned that single, private care of the insane in houses, other than in their own homes, should have the sanction of law and the supervision of State officers. Of the results of private treatment of the insane the author has made no statement from which its value may be estimated. In the last report of the English Commissioners of Lunacy may be found the proportion of per cent. of recoveries to admissions for the year, which is presented in this connection :

County asylums . . . . .	42.26	Registered hospitals . . . . .	45.56
Metropolitan licensed houses . . . . .	39.07	Provincial licensed hospitals . . . . .	36.48
Private single patients . . . . .	10.83		

The book has no special suggestions or advantages to offer for the benefit of the insane of the indigent or middle class, but is in the line of improved care of the insane of the private class who are able and willing to pay a large weekly charge. It is also to be accepted as a mild protest against some of the acknowledged defects of the existing hospital system which time and improved plans will correct. J. B. C.

3. The name Bedlam is so inseparably connected with, and made a part of the history of the treatment of the insane, and so much that has

redounded to the credit of England's lunacy administration received its birth and impetus in the revelation of the practices of old Bedlam, that it seems eminently fitting that from modern Bethlem a clinical text-book should be evolved, replete with ideas and suggestions for the better care and treatment of the insane. As one of the editors of the *Journal of Mental Science*, the organ of the British alienists, Dr. Savage has for a long time been known as a man of progressive ideas; but it is, perhaps, as a clinical teacher at Guy's, and in the wards of his own hospital, that his work has been most effective, if not the most widely known.

The work under consideration is the result of an attempt to "take stock" of a mass of observations and deductions accumulated during the experience of twelve years as a superintendent of a hospital for the insane, and a lecturer on insanity, and, as would be expected, is of a very practical nature.

Dr. Savage is met at the outset by the same difficulty which all writers upon mental disorders have encountered, when he attempts to define insanity. From a medical standpoint, he says it is to be considered "a disease of the brain." Would not it be more in accordance with the facts to say a symptom of a disease of the brain? To borrow from the author's own words, "sanity" and "insanity" are words which we use to designate certain conditions, neither of which can be rigidly confined within the bounds of a definition, and as we regard sanity as the condition resulting from the normal action of a healthy brain, so we must consider insanity as the symptom of a diseased brain, and not as the disease. Dr. Savage says, in discussing this point:

"A man in fact must be considered as sane, or insane, in relation to himself. The old, and oft-repeated statement that insanity is a perversion of the *ego*, is absolutely true. Sanity and insanity, then, are to be measured by differences or changes of habit, taste, and disposition in the individual, as well as by other symptoms of change in the nervous centres. The difference will necessarily be seen to be not only one of degree, but one of time, so that a man being sane now may be insane within a longer or shorter period. I shall take it for granted that insanity depends upon change in the nervous structures of the body; but by no means shall I restrict the causation of insanity to changes in the brain alone. . . . But the more I see of insanity the more convinced I am that the consideration of mental disorder can only be fairly approached by the complete consideration of general physiology—*i. e.*, the development, growth, and decay of the body in all its parts."

The subjects of eccentricity and genius are touched upon, incidental to the general subject of insanity. Eccentric people are divided into two classes: 1. Those having a neurotic inheritance, and who are, in fact, on the border-land of insanity, and 2. Cases developed *de novo*, who pass through life without any marked access of mental disturbance. The classification adopted by Dr. Savage shows at once that he approaches the subject from a clinical standpoint, and that he does not propose to lumber up his work or confuse his readers with the fine and unnecessary divisions and subdivisions so much affected by dilettante writers.

From our present knowledge of insanity and the pathological processes which lead up to it, it necessarily arises that any scheme of classification must be imperfect, and that various forms of mental disturbance will be found to belong—in some respects to one, in some respects to another division of the classification. In certain cases the etiological factors are so prominent that they are instinctively classified



according to their causes. In some symptomatic, and in others somatic features predominate, and until the time arrives when we shall have a clear knowledge of the pathology of insanity we must despair of a perfect classification. When that time arrives, if it ever does, then even we shall be met by the difficulty resulting from the fact that similar mental states may be caused by the same apparent condition of nerve disease or degeneration.

Dr. Savage groups his cases as follows :

- "Hysteria—mania. Hypochondriasis—melancholia.
- "Dementia, general and partial, primary and secondary.
- "States of mental weakness—chronic mania and melancholia, recurrent insanity, delusional insanity, general paralysis of the insane.
- "Paralytic insanity—epileptic insanity.
- "Puerperal insanity—postnuptial, puerperal, lactation.
- "Toxic insanity—alcohol, lead, opium, chloral, etc.,—gout.
- "Visceral insanity—renal, cardiac, and pulmonary.
- "Insanity with syphilis—myxœdema—Graves's disease—asthma—diabetes.
- "Idiocy in its various degrees."

Before giving his own classification he gives that of the College of Physicians of London, which he calls the ideal classification.

The chapter on causes is an interesting inquiry into the assigned causes of insanity—predisposing and exciting, general and special.

Following the chapter upon causation, Dr. Savage takes up, in the order of his classification, the various forms of insanity and discusses them in an able manner.

The author is not only an able clinical teacher but an experienced pathologist. His experience in the wards of Bethlem and in the pathological laboratory have not led him to take a very optimistic view of our present knowledge of the pathology of insanity. He says in one of the earlier pages :

"I may say that, with my experience of years, and after seeing many hundreds of *post-mortem* examinations of the bodies of the insane, I have met with few coarse changes within the skull, and even with the higher powers of the microscope all that can often be detected may be evidences of change in the nutrition of the connective tissue of the brain."

As regards the future, he is more hopeful ; he says :

"The time will come when the inter-relations between the millions of nerve cells with their manifold processes, and their dependence for healthy action upon healthy blood and pure air, will be better understood."

He likens the brain to the kaleidoscope, in which the pattern of the image changes while the parts remain the same, being simply changed in their relations to each other.

When will the physiologist or pathologist appear who shall teach us to recognize the characters and determine the causes of these changes of relation? And when shall we be taught how to restore the parts to their original pattern?

In view of the recent publication of Dr. Earl's work on the *Curability of Insanity*, Dr. Savage's remarks upon the subject are of interest :

"There is, in fact, a very strong feeling prevalent that a patient once having had an attack of insanity is never cured under any circumstances. This I shall oppose entirely; but I acknowledge that a very considerable proportion are maimed in one way or another by an attack of insanity."

In the matter of treatment, Dr. Savage will be found to agree in all essential matters with the practice of the better asylums of the United States. He is in favor of asylum care for the majority of cases, as affording the best hope of recovery. Of home care, he says that it is "only suitable for cases in which there is a hope of speedy recovery, and where there are judicious friends and sufficient space." Except in special instances he deprecates what is called "single care," and is convinced that other things being equal, more patients get well when associated with others than when under single charge.

The manual is written in a pleasing style and can be read by those even of large experience with profit. It will be found to confirm by its well-digested clinical facts a doubtful opinion in the minds of some or to correct a mistaken conclusion for others. For the general practitioner, it perhaps presupposes too much an elementary knowledge of the subject, which, unfortunately, the majority does not possess, but even the general practitioner will find the work of great interest and value.

E. N. B.

LA LANGAGE INTÉRIEUR, ET LES DIVERSES FORMES DE L'APHASIE. Par GILBERT BALLET, Professeur agrégé à la Faculté de Médecine de Paris. Pp. xvi. 174. Paris: Germer Ballière et Cie, 1886.

INNER SPEECH AND THE DIFFERENT FORMS OF APHASIA. By GILBERT BALLET, Associate Professor of the Faculty of Medicine in Paris.

ON APHASIA; BEING A CONTRIBUTION TO THE SUBJECT OF THE DISSOLUTION OF SPEECH FROM CEREBRAL DISEASE. By JAMES ROSS, M.D., LL.D. Pp. ii. 128. London: J. & A. Churchill, 1887.

EACH of these attractive little volumes presents, in a clear and comprehensive manner, the results of recent investigations, both clinical and pathological, upon the interesting condition of disturbance of speech.

Ballet approaches the subject from the psychological side, and discusses the mental processes involved in spoken language. He shows that men differ from one another in the manner, as well as in the matter, of their thinking. Some listen to the ideas as they flow through the mind, hearing the murmur of the stream of thought (*les auditifs*). Others are spectators of a series of mental pictures, and are continually watching the changes that pass before the mind's eye (*les visuels*). Others still, can only grasp an idea by a sort of inward effort of articulation, a silent process which, in children, is often evident in the motion of the lips which accompanies early attempts at reading (*les motifs*). Thus, in our inward speech there are various elements, one of which predominates in every one.

This may become more evident if Charcot's analysis of the mental constituents of the idea "bell" be considered. This idea, like that of any other object, is made up of a number of mental pictures. There is the picture of the appearance of the bell—the visual memory; there is the picture of the sound of the bell as it rings—the auditory memory; there is the picture of the sound of the word "bell" when spoken—the word-hearing memory; there is the picture of the word "bell" as printed

or written—the word-seeing memory; there is the picture of the muscular movements necessary to say and to write the word “bell”—the word-uttering, and the word-writing memories. These pictures together form the complex mental image involved in the idea “bell;” and the same is true of the idea of any concrete object. It will be noticed that four of these mental pictures are sensory in their origin, and that two are motor. All are necessary to the perfect representation of the idea to the mind, or for perfect expression in speech. Aphasia, according to Ballet, consists of the loss of one or more of these mental pictures, and is sensory or motor according to the character of the image lost. Loss of visual or auditory memories is rare, and may not affect speech, although it is usually associated with aphasia. Loss of the word-hearing memory is known as word-deafness, or amnesia. Loss of the word-seeing memory as word-blindness, or alexia. Loss of the word-uttering memory constitutes aphasia proper. Loss of the word-writing memory produces agraphia. These forms may be combined in any one case, but often occur alone.

It is evident that the work of Ballet is founded upon the lectures of Charcot, recently collected and issued by Bernard (“*De l’Aphasie et de ses diverses formes*,” *Le Progrès Médical*), and that its claim to originality, either of conception or presentation, is very slight. Nevertheless, it is clearly written, and as it is issued as a volume of the *Bibliothèque de philosophie contemporaine*, it may be regarded as a successful semi-popular presentation of the subject.

Ross takes up the subject of aphasia from the clinical standpoint, and gives most interesting and well-studied cases illustrating the varieties of the “dissolution of speech.” He divides aphasia into a motor and a sensory form, but admits that these are frequently combined. Motor aphasia presents three varieties: (1) aphemia, which presents many degrees from a slight defect in the power of expressive speech up to absolute wordlessness; (2) agraphia, which may vary from a condition in which the patient makes mistakes in spelling and diction, up to a state in which he cannot write or copy a single letter; and (3) amimia, a condition in which gesture language is suspended, and which, so far as known, is a theoretical form not yet observed. Sensory aphasia also presents three varieties: (1) the aphasia of recollection, in which the idea of an object fails to revive its corresponding word; (2) psychical blindness, in which the visual image of the object is lost, or its word-image is lost (word-blindness), or even the letters of the alphabet are no longer recognized (literal blindness); or in which there may be a partial perceptive blindness, which is not, however, to be regarded as aphasia; (3) psychical deafness, in which the acoustic imagery is impaired, the words being no longer recognized when heard (word-deafness), or at the command of the memory when needed; and this in its extreme form may be partial perceptive deafness in which ordinary sounds, such as the tapping on a door, are no longer understood. Ross distinguishes four or five different degrees of each of these forms of aphasia, a subdivision which seems somewhat artificial, and complicates the subject unduly.

Paraphasia, in which the motor and sensory forms are combined, presents several degrees from the mere substitution of a wrong word for the right one, up to the condition in which the patient talks gibberish; the intermediate forms being the condition in which the patient is compelled



to substitute for the correct word a paraphrase of it, or a wholly inappropriate term, and the condition in which the patient fails to appreciate the right name when uttered in his hearing.

Paragraphia is described as the condition in which the individual is unable to write correctly, or to write a continuous sentence, or to write a single word, or to copy.

Paralexia may consist of a transposition of words in reading aloud, which may be so extreme as to result in a gibberish altogether unintelligible to the listener.

Each of these forms is shown to have as a pathological basis a definite lesion in the brain at one part or other of the cortex. Motor aphasia is caused by a lesion of the left third frontal convolution. Agraphia is produced by a lesion in the second frontal convolution. Word-deafness is due to destruction of the first and second temporal convolutions in their posterior part. Word-blindness is produced by a lesion of the inferior parietal lobule and angular gyrus. Paraphasia, paragraphia, and paralexia are ascribed to lesions involving two convolutions in distant parts at once, or to a very large lesion involving an extensive area of the cortex. The usual explanation of these latter forms, urged by German authorities, is that they are due to destruction of the nerve fibres which pass beneath the cortex and associate the various areas with one another; but Ross does not favor this view.

The latter half of the book contains a careful critical study of the various explanatory schemes which have recently been offered by writers on aphasia; those of Kussmaul, Charcot, Lichtheim, and Broadbent being shown and discussed. To any one who cares to enter upon a minute study of aphasia, and to learn the many important bearings of the subject upon the psychological problem of the relation of mind and brain, this part of the work will be of great interest and value. Ross follows Hughlings Jackson very closely in his development of the theory of the evolution and dissolution of speech. The originality of the author is not however lost, and his critical insight and wide clinical experience combine to keep the discussion within medical lines. The easy diction and attractive style make the work an entertaining addition to the literature of aphasia.

M. A. S.

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DEPARTMENT OF THE INTERIOR. BULLETIN OF THE UNITED STATES GEOLOGICAL SURVEY, No. 32. MINERAL SPRINGS OF THE UNITED STATES. 8vo. pp. 235. Washington: Government Printing Office, 1886.

ALTHOUGH the number and extent of the so-called mineral springs of the United States are never realized till one reads this Bulletin of the United States Geological Survey, a careful perusal of the results there obtained go to show that the number of springs possessing any real value as medicinal agents is comparatively small.

Many of the so-called hot springs have been found to possess no larger amounts of mineral matter than ordinary indifferent waters, and largely depend on their heat for any therapeutic powers which they may possess.

The chief value to the ordinary medical practitioner of a publication of this kind is to enable him to discover whether or not springs possess-

ing powers for good exist in accessible regions in this country, and whether, if accessible, they approach the foreign waters closely enough to be substituted for them.

The space allotted to a review of this character does not permit of an extended comparison of the mineral waters of this country and abroad, and for this reason only the most important will be considered.

Roughly stated, the springs which are generally looked upon as valuable for medicinal purposes contain one or more of the following ingredients; namely, sulphur, chalybeate matters, arsenic, salines, and sulphuric acid, and perhaps lithium. Suffice it to state that in the United States we have waters possessing all these properties to a marked degree. Not only have we springs in this country which to a large extent may be used in place of European waters, but in some instances the springs of the United States actually surpass in a considerable degree those of other countries. Thus, the so-called saline springs, such as Saratoga, compare very favorably with corresponding waters on the other side, while the Balston springs of New York not only surpass all foreign springs in mineral constituents (135 grains per pint), but also excel the saline waters of Homburg, Kissingen, Wiesbaden, and Selters in their percentage of carbonic acid (53 cubic inches). Not only does this remarkable spring contain these constituents in such large amount, but it also possesses a large proportion of the carbonate of lithia—0.701 of a grain.

The springs of the United States corresponding most closely to the celebrated ones abroad are, probably, the following:

Sulphur springs: Lower Blue Lick, Nicholas Co., Ky.; Sharon, Schoharie Co., N. Y.; White Sulphur, Greenbrier Co., Va.; Salt Sulphur, Monroe Co., W. Va. Epsom salt: Bedford, Bedford Co., Pa. Sodium chloride: Hathorne, Saratoga, N. Y.; Balston, Saratoga Co., N. Y. Iron: Oak Orchard, Genesee Co., N. Y.; Rockbridge Alum, Rockbridge Co., Va.; Cooper's Wells, Hinds Co., Miss. Glauber salts: Crab Orchard, Lincoln Co., Ky.; Midland, Midland Co., Mich.

As regards the geographical distribution of mineral springs in the United States, it is found that of the Eastern States, New York and Virginia have the largest number of active medicinal waters, while the States and Territories west of the Mississippi River contain nearly all the important thermal springs we possess, with the exception of a few scattered along the Appalachian chain in Virginia and one at Lebanon, N. Y.

It is probable, too, that large numbers of the so-called medicinal springs do not possess constituents capable of acting in any way directly on the organism but rather do good by "sluicing" the renal organs and thereby aiding elimination, or, when used in baths, by increasing the action of the skin.

In conclusion, the labor involved in such a report can scarcely be estimated, and those having it in charge are to be congratulated on presenting the public with so interesting and valuable a compilation. The benefits of such publications have already been partially pointed out, and are too obvious to need further comment. The only fault that can be found with it is in the index, which, while good and copious, gives only the name of each spring without stating its chief constituent, and, as a consequence, one is forced to look up many references before he is able to find any number of a given variety of waters for comparison. Under

the act of Congress, this Bulletin can be obtained by enclosing a money order for 20 cents to the Director of the United States Geological Survey, Washington, D. C.

H. A. H.

TRANSACTIONS OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY. TWENTY-SECOND ANNUAL MEETING, 1886. 8vo. pp. 220. Boston, published by the Society.

THIS second part of the fourth volume is the largest annual contribution which the Society has yet made to its transactions, and the matter it contains makes it by far the most important American contribution of the year to the literature of ophthalmology; many of the papers, too, are of general interest.

The retinal lesions connected with albuminuria are extensively discussed: Dr. C. S. Bull contributing an "Analysis of One Hundred and Three Cases of Exudative Neuro-retinitis Associated with Bright's Disease;" Dr. George C. Harlan, a case of "Thrombosis and Perivasculitis of the Retinal Vessels;" and Dr. S. D. Risley a case of "Albuminuria of Pregnancy; Retinitis; Induced Premature Delivery."

Bull excluded all cases due to scarlatina or pregnancy, and reported only such as he had been able to follow to their termination, or to the date of the report. His patients included fifty-six men and forty-seven women. Both eyes were affected in ninety-three cases; hemorrhages occurred in one or both eyes of sixty-nine patients; while all but three came to present evidence of cardiac hypertrophy with or without valvular disease. In thirty-two cases vision improved under treatment, but without absorption of the glistening exudation at the macula.

In this series of cases the gravity of the prognosis is well illustrated. Thirty had died within six months after they were first seen, and in the next six months twenty-seven more. In the second year eighteen died; in the third year, six; in the fourth year, four; and in the sixth year, one. Of the seventeen still living, fourteen had been first seen within the last six months; two others within a year; and only one had been first seen seven years ago. In the discussion Dr. Gruening stated that of one hundred cases he had collated, none had lived more than two years.

For those cases arising from scarlatina, and especially in those from pregnancy, the prognosis is entirely different. This is well illustrated in Dr. Risley's case, where the patient, after being almost blind, with the urine loaded with albumen, and after premature delivery becoming unconscious and hemiplegic, and subsequently exhibiting aphasia, made an excellent recovery, vision coming up to the position of the right eye from counting fingers at two feet to  $\frac{20}{xxx}$ , and in the left eye from  $\frac{10}{cc}$  to  $\frac{20}{xx}$ ; while the very extensive retinal exudation disappeared entirely from the latter, and left but a few splotches on the eye of the former.

Dr. Harlan describes a case of almost universal change in the retinal vessels of one eye, with small hemorrhages and other slight retinal changes in the other eye, in a patient who shortly afterward had albu-



minuria and partial left hemiplegia. The case is illustrated by a plate showing the appearance of the fundus; the darker red of the normal vessels being replaced by broader bands of glistening white.

It has from time to time been remarked that "Listerism" and the "gospel of cleanliness" seem to arouse no general interest among ophthalmic surgeons. The reason doubtless is, that it has never been customary to invite assistants to thrust their dirty hands into the corneal incision; while the dictum of high authority forbade the introduction of any instrument not absolutely necessary, and the necessity for perfectly keen edges, and smooth-working joints invites to scrupulous cleanliness of such instruments as must be introduced. Then, too, the constant bathing of the eye by the lachrymal secretion, and the outpouring of the aqueous humor through any corneal incision tended to prevent infection. So that the ophthalmic surgeon practised asepsis, as the rustic talked prose, without knowing it. But although this was generally true, it occasionally happened that in the most promising case, after the neatest operation, an eye would be lost by general purulent inflammation; indicating, that to be right by chance, is not so safe as to be right by definite knowledge. Attention is called to the subject by Dr. H. Knapp, by some "Remarks on Pyogenic Microorganisms, with Demonstrations and Experiments." The demonstrations included the making of cataract extractions upon the eyes of four rabbits; on the left eyes with clean instruments, on the right with instruments contaminated with staphylococci. The operations were rudely done, and the injury to the left eyes increased by stirring the deeper parts with a sterilized hook. Yet while the right eyes all showed free suppuration when exhibited twenty-four hours later, three of the left eyes remained free from suppuration throughout, and the fourth, showing it at a later date, was believed to have been contaminated by the right eye of another rabbit kept in the same box, so that their heads were in close contact. Dr. Knapp believes that for eye surgery smooth-cutting instruments are best sterilized by washing in clean water, and wiping and polishing on a clean towel; because any efficient antiseptic solution is likely to dull a cutting edge. Tarnished instruments cannot be cleaned in this way, and rough instruments must be placed in some antiseptic solution.

Cataract extraction has its usual share of papers and discussion. Dr. G. Strawbridge offers a "Report of Two Hundred and Sixty-one Cases;" Dr. H. Knapp, a paper on "Cataract Extraction without Iridectomy;" Dr. D. Webster, "Report of Fifty Cases of Cataract Extraction with Remarks;" Dr. H. D. Noyes, "Extraction of Hard Cataract—Death on the Fifth Day—Examination of the Eye." The principal interest in these papers and the extended "discussion" which follows them, attaches to the operation of extraction without iridectomy, as to which there is an agreement that its value and the classes of cases to which it is suited are not yet determined; to the washing out of the conjunctival sac and the anterior chamber with antiseptic solutions, which is recommended; and the use of cocaine for operations threatening the integrity of the eye.

Bearing on the latter point several speakers report bad effects from the free use of strong solutions, but there seems to be a general agreement that smaller quantities, such as a drop or two of a two or four per cent. solution, answer the purposes of a local anæsthetic about as well and are free from danger. It is to be feared that the danger which cocaine

brings to the non-vascular cornea, both by the anæsthesia which allows the unrecognized presence of irritants, and the lessening of its nutritive supply by contraction of the neighboring vessels, is not yet sufficiently understood by many who prescribe it. Recently the writer has seen tedious and very painful inflammation of the cornea with extensive superficial sloughing and consequent opacity, caused by frequently repeated applications of a four per cent. solution of cocaine to relieve the pain of an acute catarrhal conjunctivitis. The attending physician had ordered the solution to be used at considerable intervals, the patient found it gave relief, which was of short duration, and repeated the application with each recurrence of the pain. There resulted the loss of most of the surface of the cornea, leaving an exquisitely painful ulcer and permanent damage to the sight.

Returning to our subject, we find a paper by Dr. B. E. Fryer on "The Use of Hot Water in Some of the Conjunctival and Corneal Inflammations." Not warm, but hot water is to be used. He says:

"I was astonished in the earlier cases (it being new experience to me) at the tolerance and even indifference to the heat by the patient. Water in which I could not retain my hand a minute, apparently made no unpleasant impression on individuals who had used it at the same temperature for a few hours or for a day or two. The temperature of the water should not be lower than 140°, and as much higher as can be tolerated; of course, short of blistering."

Its use was recommended in purulent and catarrhal conjunctivitis, phlyctenular ophthalmia, and in corneal inflammations and ulcers. It is especially effective in relieving the pain of the latter. Dr. Fryer's estimate of such treatment is confirmed by other members.

Dr. Wm. F. Norris offers "Some Remarks on Asthenopia and the Changes in Refraction in Adolescent and Adult Eyes," including the report of a series of cases of hypermetropia diminishing or passing over into myopia. He regards diminishing hypermetropia and increasing myopia as different stages of the same process; and "would urge, therefore, the careful correction of every case of ametropia where there is accompanying asthenopia." "All such cases should be carefully measured under a strong mydriatic, as it is impossible to correct them accurately without it." While under the influence of the mydriatic the eye should be protected by dark glasses, lest the excess of light "cause a low grade of chorio-retinitis, which it is much easier to call into existence than to cure."

Dr. J. A. Andrews contributes a paper on "The Electric Light as an Illuminator—The Effect of Strong Light on the Eye;" based in part on the examination and observation of eleven hundred persons habitually working by the light of the incandescent lamp of Edison. From his conclusions, we quote:

"The *arc light* in its present state should be positively rejected as unsuitable and actually harmful to the human eye, particularly on account of its steadiness. The *incandescent light of Edison*, because of its steadiness, adequate power, and composition, is safe, and occupies at present the first position as a means of artificial illumination."

Dr. W. F. Mittendorf gives an account of "Two Epidemics of *Moluscum Contagiosum*," a skin disease, interesting the ophthalmologist by its predilection for the eyelids. These epidemics, including nearly

one hundred cases, throw some light on the mooted question of the contagiousness of this affection.

Reports of cases; and descriptions of new instruments, tests, and procedures; with a couple of papers on geometrical optics, occupy the remainder of the volume. E. J.

L'AMPUTATION DU MEMBRE SUPÉRIEUR DANS LA CONTIGUITÉ DU TRONC. (AMPUTATION INTERSCAPULO-THORACIQUE.) Par PAUL BERGER, Chirurgien de l'Hôpital Tenon, Professeur Agrégé à la Faculté de Médecine, Membre de la Société de Chirurgie. G. Masson: Paris, 1887.

INTERSCAPULO-THORACIC AMPUTATION OF THE UPPER EXTREMITY. By PROF. PAUL BERGER. Paris, 1877.

THIS monograph by Prof. Berger is a treatise upon amputation of the upper extremity and scapula, either at one operation, or in consecutive periods. He designates this procedure as "Interscapulo-thoracic amputation," but it is usually spoken of as amputation above the shoulder-joint. The book, which is written in the French language, contains 371 pages, and is illustrated with several woodcuts and two colored lithographic plates. The style is simple, and can be readily understood even by one whose knowledge of French is not great.

The author states that the meagre notice of this operation which is found in the classical treatises upon operative surgery, renders it desirable that a thorough study of this subject should be undertaken, since the operation, though not often required, does in some, otherwise desperate, cases afford an effective resource. The histories of fifty-one cases culled from literature or from the personal experience of the author are recorded, and form the basis of the excellent critical remarks which follow. The operation is altogether modern, the earliest case recorded being that performed by Ralph Cumming, a surgeon in the English Navy, in 1808, though Cheselden figured a cured case of accidental ablation of the upper extremity and scapula in his *Anatomy of the Human Body*, published in 1768.

After giving the details of the different operations which have been performed, the author considers the subject from various standpoints, such as the mortality inherent to the operation, the causes of death, the accidents occurring during and after the operation, the indications for the operation, and the remote consequences which may follow it, and finally general considerations upon operative technique. The mortality varies with the nature of the affection for which the operation is performed, thus, in those cases where amputation is performed for pathological causes the mortality is about 20 per cent., whilst in traumatic cases 30½ per cent. die. The mortality of primary operations, in which the arm and scapula are removed at the same time, is about the same as in secondary operations where the shoulder blade is removed some time subsequent to the primary operation. This is rather an exceptional fact, as it is a common observation that a primary amputation at a certain height is usually more fatal than a secondary operation performed at the same level. Amongst the immediate results which may



occur are hemorrhage, the entrance of air into the veins, shock, and purulent infection. Air has found entrance into the axillary vein upon four occasions, as was announced by a peculiar gurgling sound and followed almost immediately by alarming sycople. All these patients recovered from this accident with one exception.

This operation has been performed for tumors of the humerus and scapula, usually malignant in character, for osteitis, and gunshot wounds. Of the fifty-one cases reported eleven were done by American surgeons; the first complete ablation of the upper extremity, scapula, and greater part of clavicle at one operation, was performed by Dr. Dixie Crosby of the United States, in 1836. In conclusion, this thesis contains about all that is known upon this subject, and a careful perusal of its pages will be both interesting and instructive.

R. W.

BEFORE TRIAL. WHAT SHOULD BE DONE BY CLIENT, SOLICITOR, AND COUNSEL. By RICHARD HARRIS, Barrister at Law. TOGETHER WITH A TREATISE ON THE DEFENCE OF INSANITY. London: Waterlow Bros. & Layton, 1886.

THIS small volume of less than three hundred pages, is neither more nor less than it professes to be. This in itself is a virtue. It is written in a pleasantly clear and concise style. It is intended for lawyers, and, as a whole, therefore, need not be fully considered here; but, as the latter part is quite as much for the doctor as for the lawyer, we refer to it. In Chapter XVII. we have the introduction to the defence of Insanity, and in the following 60 pages the test questions, the value of the decision in the McNaghton case, and the evidence of insanity and medical authority are discussed.

The note of the introduction is very unlike that sounded by most barristers, and our profession must welcome a man who is not tied and trammelled by authority. He maintains that it is justice that is wanted, the true relationship of the established facts and not the opinions of the long dead and forgotten. He says, "I have always felt that the medical profession is too little regarded in this question of insanity. Medical men are the very best, nay, they are almost the only persons capable of pronouncing a trustworthy opinion on the subject. They are too often ignored, as if they always came to get a prisoner acquitted, and as if they had a motive in so doing." We agree with this, but like our authority, we must object to authority, for it is only resting on authority, to suppose that any medical man can on general principles decide on insanity: only those can speak with any degree of force who have lived with or had many opportunities of studying nervous disorders in the insane.

In Part I. our author instructs the solicitor in his preparation of the brief when the plea of insanity is raised, and, in passing, one may say, all the evidence really is taken as if a crime is the only point ever to be considered in relationship to insanity. If our author would treat the question of validity of wills and devising capacity as well as he has the evidence in criminal trials, he would be a public benefactor.

In giving directions for taking evidence on insanity, Mr. Harris shows practical knowledge and clear insight. He reflects the popular opinion that the plea of insanity must be a last resource. As evidence of the uncertainty of the relationship of symptoms, he points out that conditions or states of unconsciousness, whether due to somnambulism, to epilepsy, or drink, may render a man ignorant of his act, and yet, while for the one a man may be considered responsible, for the other he is not.

Drunkenness is no excuse, but insanity produced by drink is; this certainly is an anomaly, for the single lapse may land a man on the gallows, while habitual intemperance may send him to an asylum.

Our author gives examples showing that one cannot decide as to responsibility by proving whether a man's mind went with the act or not, and proceeds to emphasize his belief that the defence must depend on common sense and not on technicalities; no definition of madness can possibly be made, and, therefore, it is best not to attempt to do more than lay facts, not definitions, before the jury.

No reliance is to be placed on whether a man knew or did not know that the act he was perpetrating was wrong, and the misconception of the whole question by judges is attributable, first, to universal incapacity to define insanity, and, secondly, to total misconception by the judges of what insanity is. The tendency of judges to "follow my leader," and to continue in doing unreasonable things because their predecessors did them, is forcibly exposed.

Very properly he points out the utter folly of supposing that any one test can be applied to all cases, and he shows that the fact that a policeman near at hand having a restraining influence is not conclusive evidence of criminal rather than insane intention.

"Madness has never been incompatible with knowledge except in legal minds," sums up the judgment of most lawyers on mental disorder. The test of "self restraint" being proved to be a false one, the test of knowledge of "right and wrong" is discussed and discarded as being only "the policeman at the elbow again."

"It is enough to say in answer to all such unscientific tests that insane people, like others, are subject to fear; that they refrain from committing certain deeds because they know they are wrong and that they will be punished if they commit them; and they sometimes refrain because they are under the delusion that a policeman or keeper is watching them."

Mr. Harris sees clearly that the only thing to be really decided is, whether the prisoner is sane or insane, and if he be decided to be insane nothing more should be needed. Doctors alone should decide or produce facts proving this, and they should be able to consider the facts of the man's life and inheritance, and not merely the conditions associated with the criminal act, though the crime itself is often the most marked evidence of insanity.

With all the support given to the medical witness, his weaknesses are also pointed out. "The moment medical men take sides they are useless" is a perfectly true statement of what, we regret to say, is a common occurrence.

In Part II. we have a very full discussion of the points in the Mc-Naghton case, and as these are more for lawyers than for doctors we pass them over, only saying the whole is very trenchantly and logically considered, and all in favor of experience and common sense.

Part III. is eminently practical, showing the kind of evidence which should be produced and giving its relative value. He advises that in the brief, facts of eccentricity or injury should take the place of theory. Sunstroke in India is treated as sceptically by juries and judges as it is by asylum physicians and had better not be trusted to.

It is only for us to say that our author has a very thorough grasp of the relative value of medical indications, laying much stress on such conditions as epilepsy and neurotic inheritance. He does not quite make clear, however, that there may be brain disease without mental disorder, and we feel it would be unwise to loosen his faith in the fixed and determined connection between mind and matter lest he should become half-hearted in the future in the defence of our professional knowledge. And now we must leave this book with a very sincere hope that it will be widely read by both lawyers and doctors.

We are inclined to think in one way that it is too long and in another it is defective, and our desire would be that the more useful and practical parts should be retained in any future edition, but that the discussion on the McNaghton case and the judges' opinions should be enlarged upon and printed apart, and that other points, such as disposing and contracting capacity, should be treated.

The author would thus give us a good handbook of great medico-legal value.

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THE HYGIENE OF THE VOCAL ORGANS. A PRACTICAL HANDBOOK FOR SINGERS AND SPEAKERS. By MORELL MACKENZIE, M.D. Lond. Third edition. 12mo. pp. 230, illustrated. London: Macmillan & Co., and New York, 1887.

As, according to the preface, every singer or actor of note in Great Britain, with hardly an exception, has at one time or another come under the author's hands, it was to be expected that his Handbook would have a large circulation; and so a third edition has been issued within a few months of the issue of the first.

Being intended for the general public, little note is requisite in this journal. While information and advice are given to singers and speakers with considerable detail, exception is taken as to the necessity for their knowing anything about the anatomy and physiology of their vocal and articulating organs. Amid occasional exhibitions of good, dry humor, we notice with surprise some undignified pseudocaustic raillery—*i. e.*, against teachers and others who have endeavored to go over the same and similar ground, and with whose views and results there is some discordance in the context. Pictures 12 and 13, of the appearances of the glottis in the head and falsetto registers, with an elliptic opening in the middle third of the glottis, must surely be exceptional.

Like all the advice given by Dr. Mackenzie to his colleagues, the advice given to his patients and their class is in this book good and commendable; and to English-speaking physicians treating singers and speakers, it will be of almost equal value.

J. S. C.



DISEASES OF THE EAR, AND THEIR TREATMENT. By ARTHUR HARTMANN, M.D. (Berlin); translated from the third German edition by JAMES ERSKINE, M.B. 8vo. pp. xiv. 283. Edinburgh: Young J. Pentland. New York: G. P. Putnam's Sons, 1887.

IN the translator's preface we find that "this translation has been undertaken with the view of placing in the hands of English practitioners and students a book specially suited to their requirements." If it had been said that the task was undertaken in order to place before English readers one of the best German works on otology, we should not have demurred. We must, however, enter our protest against the suggestion contained in the above sentence, that there are not many excellent works written by English and American authors in their mother tongue. The names of many such will at once present themselves to the reader if he is interested in aural surgery.

Dr. Hartmann's work is, however, excellent, and as a book of reference most valuable. At the same time, we venture to doubt whether it is sufficiently elementary for the student or young practitioner who has not had the advantage of clinical instruction in otology.

We are glad to see that in discussing "otitis externa diffusa," the view is expressed that this affection is commonly either secondary to inflammation of the middle ear, or due to irritants—chemical, thermal, or mechanical.

With reference to exostoses of the meatus it seems to us that the author contradicts himself in the following sentences, which have been verified by consulting the German work: "This [*i. e.*, treatment] is limited to removal of obstructing matter so long as the contraction is not very great, and the dulness of hearing is only caused by temporary obstruction of the space which exists." . . . "As a rule, the exostosis should be removed as early as possible, especially if still growing, as the operation is more easily performed the less the meatus is occluded."

The advice given on page 145 is perhaps not quite in accordance with the views of English and American aurists, many of whom regard the use of bougies for the Eustachian tube with suspicion if not distrust.

In the section on "Chronic Inflammation of the Middle Ear without Exudation," we find the various methods of treatment discussed; we would, however, take exception to the statement that "vapor of chloride of ammonium, which has been in use for a long time, is now rarely employed." We think that one of the forms of chloride of ammonium inhalers now in common use, is likely in such cases—provided always the case is or has been of catarrhal origin—to be of great service after thorough patency of the Eustachian tubes has been secured. At the conclusion of the same chapter the author says: "If no benefit can be obtained by the above modes of treatment, operations must be resorted to." This is dangerous advice, doubly dangerous when it appears in a work written for students. The operations, afterward referred to, are some of them perilous, and most of them commonly useless—*e. g.*, paracentesis by the galvanic cautery, tenotomy of the tensor tympani, and excision of the membrana tympani and ossicles. We believe that this last-named proceeding may have a future before it, but we maintain that the time has not come when it can safely be recommended in an

elementary work; neither do we yet know how to diagnosticate cases with sufficient accuracy to enable us conscientiously to recommend it.

Notwithstanding these few strictures we have felt obliged to make, we say again, as we said before, that Hartmann's work is, on the whole, most excellent and trustworthy.

The English edition reflects great credit on the publisher, paper, illustrations, and type being all equally praiseworthy. We are sorry to say that the translator might have done his work better. In not a few places the sense is not the same in the English as in the German work. Thus, on page 114 (English edition) the following sentence occurs: "Usually in cases of perforation [*i. e.*, of the membrana tympani, Rev.], with a knitting-needle, the consequent pain, tinnitus, dulness of hearing, and perhaps fainting occur only at intervals." The error here lies in the fact that in translating the words "nur vorübergehend," the writer has used as their English equivalent "only at intervals," whereas the sentence should run "only transient . . . occur." We have no doubt that if a second English edition should be required the translator will correct this and other similar mistakes (of which we regret to say there are not a few). We would also suggest that more attention should be paid to English composition. The following may be a literal translation, but it retains too much of the German idiom (not unmixed with a Scottish element) to be altogether acceptable to the taste of an English reader: "Therefore ought we always to open the antrum freely along with the neighboring cells" (p. 190).

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HANDBUCH DER ALLGEMEINEN UND SPECIELLEN ARZNEIVERORDNUNGS-  
LEHRE. Auf Grundlage der neuesten Pharmacopöen. Bearbeitet von  
DR. C. A. EWALD. Elfte neue umgearbeitete und vermehrte Auflage.  
Berlin: Verlag von A. Hirschwald, 1887.

HANDBOOK OF GENERAL AND SPECIAL THERAPEUTICS. By DR. C. A.  
EWALD.

THE object of Professor Ewald in writing his now well-known work was for the purpose of providing his medical brethren with a book on formulary, rather than a text-book, on the use of drugs in disease. Every page teems with prescriptions, and the text, while showing a widespread knowledge of therapeutical literature, is cramped and dwarfed in the endeavor to introduce a multitude of formulæ.

The pharmacological literature of every civilized nation has been drawn upon, so that nearly every prescription has appended to it the name of its originator, while the consideration of the uses and actions of the drugs has been taken from the pharmacopœias of all nations possessing an official work on medicaments. The very fact that this book has reached an eleventh edition shows us, however, that empiricism is as rife in Germany as at home, and that a very large class of practitioners of medicine still treat their patients by the shotgun method rather than by stern reasoning and logic.

As a work on formulary Ewald's book certainly distances all com-

petitors, and although the labor involved in its construction must have been enormous, the author certainly cannot complain that his efforts have not been appreciated.

H. A. H.

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HIP DISEASE IN CHILDHOOD, WITH SPECIAL REFERENCE TO ITS TREATMENT BY EXCISION. By G. A. WRIGHT, B.A., M.B. Oxon., F.R.C.S. Eng., Assistant Surgeon to the Manchester Royal Infirmary; Lecturer in Clinical Surgery in the Owens College, etc. 8vo. pp. 239. With 48 original woodcuts. London: Longmans, Green & Co., 1887.

In noticing this monograph, dealing with so many questions which, despite all experience and research, are still moot points, it will be impossible to do more than touch upon a few salient ones.

As the author has performed, between October 30, 1880, and July 8, 1886, one hundred excisions of the hip, we are warranted in concluding that he trusts but little to nature in morbus coxæ. A very fair *résumé* is given of the pathological views of all the more prominent writers who treat of hip disease, and the conclusion is arrived at "that all cases of true chronic hip disease are truly tuberculous." The chapter on "Symptoms" is full, but we can only note that swelling of the inguinal glands indicates osteitis of the pelvis rather than the femur; that "nearly every case of chronic disease of the hip," if examined "at a certain period of its course," will "be found to contain pus;" and that the disappearance of abscesses is sometimes to be accounted for by their discharge through the rectum, which "is commoner than is supposed." The belief is expressed "that chronic hip disease begins invariably, or nearly so, as an osteitis," and that "cases of true hip disease rarely recover without entire destruction of the upper epiphysis of the femur, usually accompanied by abscess, and always result in shortening, with more or less deformity, and a very large majority die; very few reach adult life." . . . When the following sentences are read it will be seen exactly what the author's views as to treatment really are: "I agree that abscesses should be opened, but as there then remains what is practically a sequestrum as the source of the abscess, I think it should be removed—*i. e.*, the upper end of the bone excised (except in cases of residual abscess. . . .);" in other words, he advises treatment by rest and extension, but if an abscess forms despite this, excise in all cases. Again, "treatment short of excision when once suppuration occurs, is useful only as a palliative, or a means of temporizing." In justice to the author we must say that although he has excised in about one case out of every *six seen*, he believes that such radical treatment will not be so often required in other than hospital patients. As to the method of operating, he prefers to saw off the bone *in situ* through the trochanter, and then disarticulate the fragment. The elastic bandage is thought useful in the after-treatment where there is much thickening of the soft parts, or the sinuses remain "flabby and sluggish." The mortality of Mr. Wright's excisions, he contends, amounts to only three per cent., explaining two other deaths by a preëxistent pyæmia. Amputa-



tion, either before or after excision, is shown to be more applicable than is usually taught, and the implied advice is given that even with extensive pelvic disease nearly one-half of the pelvis may and should be removed after a preliminary ligation of the common iliac artery. In the appendix are given the history of a number of cases of special interest, and a very full bibliography of the subject.

Our space forbids anything like an analysis of Mr. Wright's work, which certainly advocates the most heroic treatment of this lamentably frequent disease. Those who desire to study hip disease, from an almost purely operative point of view, should read this book, but for ourselves we can only say that, being not quite so much of a pessimist as Mr. Wright evidently is, we have more faith in conservative treatment than he has, and would warn those who read his book that the views held are so extreme as to demand more proof than he has adduced in support of his position.

C. B. N.

ANALYSIS OF THE URINE, WITH SPECIAL REFERENCE TO THE DISEASES OF THE GENITO-URINARY ORGANS. By R. B. HOFMANN, Professor in the University of Gratz, and R. ULTMANN, Docent in the University of Vienna. Translated by T. BARTON BRUNE, A.M., M.D., etc., and H. HOLBROOK CURTIS, Ph.B., M.D., etc. Second edition, revised and enlarged. 8vo. pp. 310, with notes. New York: D. Appleton & Co., 1886.

In the Journal for January, 1880, we noticed the appearance of the first edition of the translation of Hofmann and Ultmann's admirable work on the examination of the urine, and expressed an opinion of the worth of the original, which we still entertain. The present edition embodies the advances which have been made in the technique of examination of the urine since the first edition was prepared, and no small part of this work has been contributed by the translators. An example of the share they have taken in bringing the work up to date is found in the chapter on albumin, which, we regret to see, they still call "albumen." In doing this, they translate the German "*Eiweiss*" literally; but it is of some importance to note that the albumin found in urine is not albumen (egg-albumen).

The translators, also, use the word "cylinders" for what are universally known in English and American books as "tube-casts." This we consider an error of judgment.

We might multiply examples of too literal translation from the German in this work; but we are happy to say that the present edition is so much an improvement upon its predecessor that we cannot repeat our former comment upon the familiarity of the translators with the language in which it was first written. On the contrary, it gives us pleasure to note that many of the lapses contained in the first edition have been corrected in this one, and to commend the smoothness which marks it in general. As to the intrinsic merits of the book, we need say little. But we can say that it is one of the best and clearest works on the examination of the urine with which we are acquainted. In the part devoted to the clinical application of its teachings it is exceptionally good.

C. W. D.

DIE URSÄCHLICHEN MOMENTEN DER AUGENMUSKELLÄHMUNGEN: DIE NICHT-NUCLEAR LÄHMUNGEN. Von L. MAUTHNER, K. K. Universitäts Prof. in Wien. Wiesbaden, 1886.

THE CAUSAL CONDITIONS OF MUSCULAR PARALYSIS OF THE EYE: NON-NUCLEAR PARALYSIS. By PROF. L. MAUTHNER.

In the number of this journal for October, 1885, we noticed the twelfth instalment of Prof. Mauthner's clinical exposition of eye affections, which was devoted entirely to the nuclear paralyses of the ocular muscles. This, the thirteenth number, is a continuation and conclusion of his study of the causes of ocular paralyses, and is given to the cortical and fascicular, the basal, the orbital, and peripheral paralyses. Together, the two constitute by far the most thorough and elaborately wrought-out study of the etiology of eye paralyses that has ever been published; and implying, as the major part of these paralyses do, lesions within the cranial cavity and a direct or remote manifestation on the part of the other divisions of the nervous system, they are of more interest and importance to the physician than ophthalmological studies usually are. We therefore direct the attention of students of the nervous system to those brochures, and predict for him who is fortunate enough to peruse them, a great pleasure in following out the keen and close analysis of symptoms which is so characteristic of the writings of Prof. Mauthner.

Space is lacking for more than a simple citation of one or two salient points. In speaking of paralysis of the third pair, for example, if the branches to the iris and ciliary muscles remain free while there is at the same time contra-lateral hemiplegia, the diagnosis is fascicular paralysis; if, however, there is total paralysis of the third pair, it argues a circumscribed alteration at the peduncles at the exit of the oculomotorius, or a change extending from the pedunculus to the third ventricle, or the pathological change may be only basal.

Relapsing oculo-motor paralysis is considered in great detail, and an analysis of all the published cases given. The conclusion from a study of these cases is, that it is basal in its character, and due to a slowly developing pachy- or lepto-meningitis. He also points out as a matter of the highest practical interest, that double-sided ophthalmoplegias of an intracranial nature can be developed acutely or subacutely, and can disappear in a relatively short time.

Homonymous hemianopia, with unilateral nerve paralysis, can come from nuclear or basal changes. Amaurosis of the corresponding eye alone, or in conjunction with temporal hemianopia of the second eye, argues a basal change certainly. The orbital and peripheral paralyses are dealt with in the same exhaustive manner, but being of more especial interest to the ophthalmologist, we shall not dwell upon that part, simply commending them for the force and clearness with which the various points are put.

S. M. B.

# QUARTERLY SUMMARY

OF THE

## PROGRESS OF MEDICAL SCIENCE.

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### ANATOMY.

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UNDER THE CHARGE OF

GEORGE D. THANE, M.R.C.S. ENG.,

PROFESSOR OF ANATOMY AT UNIVERSITY COLLEGE, LONDON.

#### THE CONSTITUTION OF THE RESTIFORM BODY.

W. BECHTEREW has studied the development of the restiform body in a series of fifteen brains, from various periods of fœtal life. He finds that this body is made up of five constituents, which are enumerated in the order of acquiring their medullary sheath: 1. The direct cerebellar tract of the cord. 2. Fibres springing from the nucleus of the funiculus cunextus of the same side. 3. Fibres springing from the lateral nucleus of the same side. 4. Fibres issuing from the nuclei of the funiculi graciles of both sides; the set derived from the nucleus of the same side ascend to the restiform body as the posterior superficial arcuate fibres; while those springing from the opposite nucleus pass forward in the interolivary layer (*olivenzuischenschicht*), and emerge on the inner side of and through the pyramid, as well as between the pyramid and the olive, and form the anterior superficial arcuate fibres. 5. Fibres from the lower olive of the opposite side.

The last set of fibres were demonstrated by Meynert; but they do not, as assumed by Meynert and Wernicke, form a continuation of the posterior columns to the cerebellum. They compose, with a tract of fibres previously shown by Bechterew, ascending in the tegmentum, a system which unites the cerebellum with the base of the cerebrum through the lower olive.

Neither the *formatio reticularis* nor the pyramid of the medulla oblongata has any relation to the restiform body; nor does the latter receive any fibres from the fifth and eighth nerves, as stated by Edinger. The auditory nerve is connected to the cerebellum by a special bundle which ascends in the inner part of the middle peduncle. The fifth nerve has no connection at all with the cerebellum.

Within the cerebellum, the restiform body is distributed in three distinct bundles, viz.: 1. Containing the fibres from the direct cerebellar tract of the cord, from the nucleus of the funiculus cunextus, and from the lateral nucleus passes to the cortex of the forepart of the upper worm; 2. Composed of the fibres from the nuclei of the funiculi graciles, to the middle portion of the



upper worm on the same side; and 3. Comprising the fibres from the opposite olive, to the gray substance of the corpus dentatum, and in part, perhaps, to the cortex of the hemisphere.—*Archiv für Anatomie*, February, 1887.

#### THE MORPHOLOGY OF THE SACRAL PLEXUS.

It is by no means an unfrequent occurrence for the two popliteal nerves to arise separately from the sacral plexus; and in that case the external (or peroneal) nerve generally pierces the pyriformis muscle, the lower portion of which, therefore, separates this from the more deeply placed internal nerve. But when, in the usual arrangement, these nerves are united for a certain portion of their extent in a great sciatic trunk, the latter can be easily divided into its two constituents by dissecting off the fibrous sheath, and the popliteal nerves can be followed upward to their distinct origins. By thus separating the nerves, A. M. PATERSON is enabled to show that the construction of the sacral plexus agrees in principle with that of the brachial, and to throw light upon the morphology of the nerves of the limbs.

The nerves proceeding to the popliteal trunks are each divided into an anterior and a posterior branch. By the union of the posterior branches of the descending offset from the fourth lumbar, of the fifth lumbar, and of the first and second sacral nerves, the external popliteal is formed; and the anterior branches of the same nerves, together with an offset from the third sacral, constitute the roots of the internal popliteal. The gluteal nerves are offsets of the posterior divisions, or external popliteal roots, the superior arising from the fourth and fifth lumbar and the first sacral nerves, and the inferior from the first and second sacral nerves. The small sciatic arises from the back of the second and third, and the pudic from the second, third, and fourth sacral nerves. The branch to the obturator internus springs from the second and third sacral nerves, that to the quadratus from the beginning of the internal popliteal nerve, and the nerve of the pyriformis from the posterior branch of the second sacral. The branches to the hamstring muscles are given off from the internal popliteal nerve.

Like the popliteal nerves, the obturator is formed by anterior branches, and the anterior crural by posterior branches of the second, third, and fourth lumbar nerves.

There are thus two chief sets of nerves passing to the lower limb—one comprising the anterior crural, external popliteal and gluteal, springing from posterior branches, and distributed in the original extensor aspect; and the other, consisting of the obturator and internal popliteal, springing from anterior branches, and passing to the flexor aspect of the limb. From this it is inferred that in the primitive condition of the limbs the nerves passing into them are divided into dorsal and ventral branches, which supply the corresponding surfaces, and that indications of this arrangement are retained in the mode of origin of the nerves and their distribution to the structures of the limb.—*Journal of Anatomy*, April, 1887.

#### ON THE BURSA PHARYNGEA.

The name bursa pharyngea was given by F. J. C. MAYER to a small pouch of the mucous membrane described by him, and afterward more fully by

Luschka, as projecting from the upper end of the posterior wall of the pharynx. According to Luschka, this pouch may attain a length of 15 mm. and a breadth of 6 mm.; it lies behind the adenoid tissue, constituting the pharyngeal tonsil; and its blind upper extremity is connected with the basilar process of the occipital bone. The normal existence of such a pouch has been denied by Ganghofner and Trautmann, who found only a small depression of the mucous membrane at the spot indicated; and for this, Ganghofner proposed the name of *recessus pharyngeus medius*. On the other hand, Tornwald states that a sac or canal is present in the great majority of cases.

In view of these conflicting statements, SCHWABACH examined this region in 53 subjects, 28 being infants or young children, in whom alone a normal pharyngeal tonsil is to be seen, and in no case did he find a bursa as described by Luschka, while Ganghofner's account is fully confirmed.

In the young subject the pharyngeal tonsil is divided by fissures into ridges of variable height, which are directed for the most part more or less obliquely. On most preparations two ridges close to the middle line are more prominent than the rest, and enclose a central furrow of corresponding depth. In some cases, however, there is a median ridge dividing this furrow. At the back of the median furrow or ridge there is generally a slight depression about the size of a pin's head, and in four instances it took the form of a recess 2 or 3 mm. deep. A small transverse fold of the mucous membrane sometimes divides this depression into anterior and posterior parts, or separates it from the groove. In several cases there was no trace at all of this hollow; and in no instance was it more than a superficial depression of the mucous membrane devoid of any connection with the bone.

In the adult there are usually but few indications of the original conformation of the tonsil, the median cleft and its bounding ridges being the parts most frequently retained; but even when all the ridges have disappeared, the furrow is still represented by a slight fossa or a canal bridged over by the mucous membrane. Such bridges of mucous membrane are of frequent occurrence on the pharyngeal tonsil, on the roof of the pharynx, and in the recess of Rosenmüller; and the cavities may also be completely enclosed by mucous membrane giving rise to cysts. The descriptions of the bursa given by Luschka and Tornwald are regarded as relating to pathological states.

It has been shown by Dursy and Froriep that the *recessus pharyngeus medius* is not connected with the formation of the *hypophysis cerebri*; and the latter writer considers it probable that it is related to the *retropharyngeal chorda*. On this point Schwabach promises a further communication dealing with researches now in progress.—*Archiv für mikroskop. Anat.*, Feb. 1887.

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#### ON THE CLOSURE OF THE CARDIAC ORIFICE OF THE STOMACH.

It was observed by Braune that water injected in considerable quantity into the stomach through the *œsophagus*, with the body in a horizontal position, does not flow out again, although no ligature is applied. To explain this phenomenon, A. v. GUBAROFF, working in Braune's laboratory, investigated the mechanism by which the cardiac orifice is closed. In part the closure is to be explained by the action of the diaphragm, the fibres of which form a sphincter around the *œsophageal* opening; but it is mainly due to a valve-

like arrangement dependent on the relation of the ending of the œsophagus to the stomach.

In a frozen section, the stomach being distended, the lower end of the œsophagus is seen to be bent sharply to the left, the fundus of the stomach extends upward considerably beyond the cardia, and the left margin of the latter projects toward the right or lower border in the form of a rounded edge or fold containing a thick bundle of fibres of the diaphragm. When water is injected under a low pressure into the stomach from the duodeno-jejunal flexure, it does not flow into the œsophagus so long as the parts are in their natural position; but if the stomach is drawn downward, so as to stretch the angle between the œsophagus and the fundus, the fluid enters the gullet. In the child the œsophagus takes a straighter course to the stomach, and the facility with which food regurgitates in the infant is thus accounted for. Perhaps the varying readiness with which vomiting occurs in different people is to be attributed to the degree of development of this valvular structure.—*Archiv für Anatomie*, February, 1887.

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ON THE POSITION OF THE DUODENUM, OF THE ILEOCOLIC JUNCTION,  
AND OF THE SIGMOID FLEXURE.

P. SCHIEFFERDECKER publishes observations on the variations in position of certain parts of the intestinal canal, collected during the dissection of about two hundred bodies in Rostock and Göttingen. In the duodenum the only noteworthy class of deviations relates to the length of the second part, and the consequent level at which the third part crosses the spine. This may be as high as the disk between the second and third lumbar, or as low as the top of the fifth lumbar vertebra. The situation of the duodeno-jejunal flexure is very constant.

The opening of the ileum into the large intestine is most frequently placed on a level with, and a little to the outer side of the right sacroiliac articulation. A lower position is often met with; and occasionally it lies in the cavity of the true pelvis. Only two cases were met with in which the ending of the ileum had a markedly higher position than usual; in one it was opposite the third lumbar vertebra; and in the other in front of the kidney, on a level with the second lumbar vertebra, so that there was practically no ascending colon. In both these instances the other abdominal organs were normal, and the testicles were in the scrotum.

The position of the sigmoid flexure is very variable, and the different forms are collected into four groups, as follows:

I. The flexure lies to the inner side of the descending colon.

a. The loop hangs down in the pelvic cavity. This is regarded as the normal form as shown by the developmental history, and by its being mechanically the most natural.

b. The loop is turned upward and applied to the posterior abdominal wall. In one extreme case the loop ascended on the side of the spine to the left kidney, being fixed here by the peritoneum; and in another the loop, having a free meso-sigmoideum, crossed the middle line and reached the right iliac fossa, where it touched the cæcum. Between these extremes all intermediate forms occur.



c. The loop is directed upward, but other parts of intestine intervene between it and the posterior wall; and it may come in contact to a greater or less extent with the anterior wall. These cases are very frequent.

II. The flexure lies to the outer side of the descending colon. Only one example of this condition was met with; and it is probable that it differs in kind from the foregoing groups, being not merely an irregular position of an identical loop, but a loop formed in the intestine immediately above the situation of the normal one which is undeveloped.—*Arch. für Anat.*, Feb. 1887.

#### ON THE RELATIVE LENGTH OF THE FINGERS AND TOES.

W. BRAUNE contributes some interesting observations on the form of the hand and foot in a paper contained in the volume recently dedicated to C. Ludwig by his pupils. It is well known that in works of art the hand is generally represented with the index finger more prominent than the ring finger, whereas in nature such a form is only met with exceptionally. But the attempt to estimate the length of the several fingers by inspecting the hand, or even by tracing the outline on paper, after Ecker's method, is fallacious; and only direct measurements of the bones yield trustworthy results. Braune gives a table of the length of the metacarpal bones and phalanges in 93 hands, in 39 of which the bones were still united by their ligaments, while the remaining 54 were artificially mounted. In the following statistics the latter group is not taken into account, since there may be doubt as to the proper position of some of the bones.

Taking the metacarpal bones and phalanges together, the index finger is longer than the ring in 27, and shorter in 10, while the two are equal in 2. In all the second metacarpal bone is longer than the fourth, and the phalanges of the ring finger are longer than those of the index finger. The first phalanx of the index is the longer in 33, of the ring finger in 3, and the two are equal in 3. The middle phalanx of the ring finger is the longer in all. The last phalanx of the ring finger is the longer in 34, that of the index in 4, and in one case the two are equal.

The greater length of the index finger as a whole thus depends entirely (as was pointed out by J. Marshall, in his *Anatomy for Artists*, 1887) on the length of the metacarpal bone. The greater prominence of the ring finger usually seen in the hand is attributed by Braune to a lateral inclination of the fingers to the ulnar side, due primarily to the oblique pull of the flexor muscles. The hand with a longer index finger is the higher form, not simply by reason of contrast with the hand of the ape, but because it is thereby better fitted for the special work of man.

In the same way, the foot is generally represented by artists with the second toe projecting beyond the first, but in the natural foot the great toe almost always appears the most prominent. This appearance is, however, a result of the flexion of the second toe, caused by the pressure of the shoe; and if it be carefully straightened, the second toe is generally found to be the longest. Of 37 students of his class, Braune found the second toe longer in 26, the great toe longer in 6, and the two of equal length in 5. In children and people who go barefooted the second toe is the longest.

The characteristic forms of the hand, with its longest third digit, and of the

foot, with its longest second toe, are evident at a very early period in the fœtus. Whether there is any variation in the proportions referred to among different races of men, as assumed by Ecker, Kollmann, and Park Harrison, the material at present available is insufficient to show.

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## PHYSIOLOGY.

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UNDER THE CHARGE OF

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### VISUAL CENTRES OF CEREBRAL CORTEX.

PROF. SIGM. EXNER and DR. JOSEPH PANETH found defective vision, lasting some weeks after the operation, to follow removal of parts of the sigmoid gyrus of the dog. This was observed in five out of six animals. In that in which there was no defect of vision the lesion was just in front of Munk's centres. They therefore agree with those authors who deny that the visual functions are to be restricted to the posterior parts of the convexity of the brain.—*Pflüger's Archiv*, Bd. xl. p. 62.

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### IRRITABILITY OF THE VARIOUS LAYERS OF THE CEREBRAL CORTEX.

DRS. ERNST ASCH and ALFRED NEISSER experimented on rabbits to determine whether gray surface tissue or the underlying white substance of the motor regions of the brain be the more easily excited by electric stimulation. They conclude that in the track from the surface to the deeper parts of the brain there exists a point the stimulation of which is followed by much more active movements than if any other part of the path of the impulse be similarly stimulated. This point is the boundary between the gray and white substance, and most probably it really is the innermost layer of the gray matter. With weak stimulations, the electrodes piercing the gray matter, the authors frequently found movement of the limbs on the same side of the body as the stimulus was applied to the brain.—*Pflüger's Archiv*, Bd. xl. p. 191.

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### INTRACARDIAC PRESSURE.

J. MAGINI estimates the variations in the blood-pressure within the heart of dogs by means of a special trocar pushed through the apex. The position and surroundings of the organ were but little disturbed by the operation, which was borne well by the animals, so that the investigation could be continued sometimes for an hour. Only twice in twenty-one operations did insurmountable complication arise. The trocar was connected with a manometer and cardiographic apparatus by means of a thick-walled caoutchouc tube filled with soda solution. The action of the valves thus escaped the interference with their function inseparable from Marey's mode of procedure.

The pressures were generally rather higher than those found by other observers, and the curves free from the secondary variations which are so marked on Marey's tracings. A negative pressure was found in the pericardium equal to thirty mm. of mercury.—*Arch. Ital. de Biologie*, t. viii. fasc. i. p. 125.

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#### THE UNION OF CARBONIC ACID WITH HÆMOGLOBIN.

By comparing the amount of  $\text{CO}_2$  taken up by water—which follows Henry's law—with that taken up by solutions of hæmoglobin, CHRISTIAN BOHR shows that considerable volumes of  $\text{CO}_2$  may be made to unite with the coloring matter of the blood. One gramme of pure hæmoglobin combines with about 3.5 c. c.  $\text{CO}_2$  at a pressure of 120 mm.—*i. e.*, more than double the quantity of oxygen that can be taken up. The combination is readily dissociated, for the quantity existing in the solution diminishes rapidly as the pressure is lowered. The maximum absorption is reached within the degree of pressure named above. Stronger solutions take up less per unit of hæmoglobin than weak solutions. No decomposition of the hæmoglobin occurred.—*Beiträge zur Physiologie*, C. Ludwig gewidmet, 1887, p. 164.

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#### THE COAGULATION OF THE BLOOD.

L. C. WOOLDRIDGE obtains blood from a dog immediately after the injection of peptone, which does not undergo coagulation, though kept till it decomposes. In the clear plasma separated from this by means of the centrifugal machine, two complex bodies can be shown to exist, which are both coagulable, and by whose inter-action fibrin is produced. He names them A. and B. fibrinogen, and supposes them to be a mixture or combination of albumen with lecithin. The A. fibrinogen can be precipitated from the clear plasma by cooling. It appears as small, round, colorless masses which readily combine to form a fibrinous material. In the presence of this body the plasma is easily made to coagulate, the existence of fibrin ferment having apparently no influence. If the A. fibrinogen be removed, the B. fibrinogen will not coagulate without the addition of some substance containing lecithin. B. fibrinogen, therefore, cannot be the same body as Hammarsten's fibrinogen, since the addition of fibrin ferment does not induce its coagulation; but by repeated precipitation with acid and resolution in weak alkalies, it assumes the properties of that body. The clear plasma, freed from all form elements by the centrifugal machine, contains all the ingredients necessary for spontaneous coagulation. The ferment which appears during coagulation is said to be the result and not the cause of the clotting, which depends upon some transfer of lecithin taking place from one kind of fibrinogen to the other. Other kinds of fibrinogen are said to exist in the tissues of the body which can cause coagulation either within or without the bloodvessels.—*Beiträge zur Physiologie*, C. Ludwig gewidmet, 1887, p. 221.



## MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

UNDER THE CHARGE OF

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### ACETANILID (ANTIFEBRIN).

This promising contribution to our therapeutical resources has recently been the subject of an elaborate investigation by WEILL (*Bull. Gén. de Thérap.*, Feb. 28, 1887). He arrives at the following conclusions in regard to its physiological actions: It acts especially on the nervous system, and after a period of excitation is followed by depression and collapse; it induces general anæsthesia and analgesia; it causes a notable increase in the intravascular blood-pressure by contracting the peripheral arterioles; it lowers the central and peripheric temperature, and in a toxic quantity seriously impairs the composition of the blood, changing hæmoglobin into methæmoglobin.

On the foregoing conclusions respecting the physiological actions of acetanilid, Weill bases the therapeutical applications. He has formulated the following opinions as to its therapeutical uses:

Acetanilid is an active febrifuge. It has the highest utility in almost all diseases of which the one symptom to be relieved is elevated temperature.

It acts efficiently in all nervous affections characterized by a morbid excitability of the reflex functions—as, for example, epilepsy.

It does not increase but rather diminishes the flow of urine.

Habit is set up by uninterrupted and prolonged administration.

Acetanilid, as antifebrin, has also been the subject of investigation by Prof. Lépine, who enlisted Prof. Charcot in its clinical study. As a remedy for the pains of locomotor ataxia, and for the trembling of sclerosis, it was found to relieve many, and to remove the symptoms entirely in a few. Having the power to diminish the reflex excitability of the spinal cord, it was also used in cases of epilepsy with considerable success.

GRUNNEBERG (*Berl. klin. Wochenschrift*, p. 849, 1886) reports the result of his use of antifebrin in typhoid. He finds it very effective when a considerable reduction of temperature is to be made. Although it may cause profuse sweats and severe chills preceding the rise of temperature, the action, for the most part, is free from unpleasant symptoms. He has given 2 grammes (3ss) a day without inconvenience, but 50 centigrammes (8 grains) have proved a sufficient quantity to reduce fever.

DUJARDIN-BEAUMETZ (*Bull. Gén. de Thérap.*, March 30, 1887) has also made a clinical investigation of acetanilid in continuation of the observations of Weill. As a febrifuge he does not regard it as an important contribution to our resources in this respect, and holds that it is much inferior to antipyrin for this purpose. It is in respect to its action on the nervous system that he commends its use. It is a remarkable fact that acetanilid does not influence temperature when administered in the apyretic stage, but during the height

of the febrile exacerbation, even in moderate doses, it makes a considerable impression on the pyrexia, reducing fever heat several degrees.

Dujardin-Beaumetz has never exceeded 3 grammes (46 grains), and usually gives no more than three or four doses of 50 centigrammes each (8 grains) in the course of twenty-four hours. He has employed it for the relief of three conditions, namely: for pain in general, for the pains of locomotor ataxia, and for epilepsy.

In facial neuralgia it is inferior to aconite, but when structural alterations are taking place in the nerve, as in neuritis of the optic, acetanilid is superior to all other remedies. In muscular rheumatism and neuralgia, and in neuralgia of the articulations, he has found it superior to the salicylates. Also, in the flying pains of tabes it seems to be peculiarly effective. Sometimes the effects are lasting, but in other cases the remedy loses its influence after long-continued use.

In epilepsy Dr. Dujardin-Beaumetz finds acetanilid a useful remedy. Recognizing the uncertainty which must attend the exhibition of a new remedy in this malady, so much influenced by mental impressions, a degree of reserve is necessary in accepting favorable conclusions. In his own hands and in the experiences of others, especially of Prof. Grasset, of Montpellier, some remarkable results have been obtained. With due reserve, and making allowances for error, there is yet sufficient evidence to show that acetanilid is a valuable addition to the remedies now employed in the treatment of epilepsy.

We add to the foregoing observations on acetanilid, or antifebrin, some studies of its therapeutical action made by H. EISENHART in Ziemssen's Clinic, which appear in the *Centralblatt für die gesammte Therapie* for April, 1887. Eisenhart reports on thirty cases of disease, including typhoid, acute rheumatism, pneumonia, some eruptive fevers, and other febrile disorders. The doses usually administered ranged from four to eight grains. The effects are observed in about two hours, and the reduction of temperature amounts to  $1^{\circ}$  to  $4^{\circ}$ , the maximum impression occurring in three to four hours. The normal temperature is little, if at all, affected by it, and hence, as has been observed by others, it should not be administered in the apyretic stage, but rather at the time of greatest heat. The duration of the antipyretic action ranges from four to fourteen hours. As is the case with antipyrin, antifebrin causes profuse sweating; but it is well borne, does not cause nausea or vomiting, and is readily taken.

In acute rheumatism, as compared with antipyrin, Dr. Eisenhart finds it inferior, and it is also less curative than the salicylates; but he admits that it is a valuable antipyretic in general, and especially in typhoid. He expresses the conviction that the course of typhoid is rendered milder and its duration lessened by the administration of antifebrin.

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#### ANTISEPTIC HYPODERMATIC INJECTIONS.

So much has been published of late on this important subject that our readers may desire more exact information than has hitherto been furnished. The oil of vaseline which is used as the vehicle is obtained better from Russian petroleum. It is described by DR. LEY, who pursued his investigation in the laboratory of Dujardin-Beaumetz (*Bull. Gén. de Thérap.*, March 30,

1887), as a colorless, inodorous, tasteless, oily fluid, neutral in reaction, and of a density varying between 0.820 and 0.880. It causes no pain or induration when thrown under the skin. It dissolves the essential oils in equal parts, and such substances as iodine, bromine, sulphide of hydrogen, carbolic acid, iodoform, iodol, sulphide of carbon, and by some special manipulation, a large number of the alkaloids, as morphine and cocaine, in varying proportions. When thrown under the skin, oil of vaseline diffuses rapidly, and as quickly conveys the medicaments incorporated with it, through the system.

The clinical studies were made in the wards of Dujardin-Beaumetz in the Cochin Hospital, and the results derived from various agents used in this way are set forth in the communication from which we now quote. The solution of iodine gives some admirable results in cases of emphysema and asthma and bronchial catarrh; the cough diminishes, the expectoration lessens, the sense of oppression ceases, the appetite is restored, and sleep is again enjoyed. Solutions of carbolic acid and eucalyptol have been tried in a great many cases of chronic bronchitis and pulmonary tuberculosis. In some examples of the latter the injections caused too much excitement and fever to be persevered in; but in those of a chronic and subdued character, with little fever, eucalyptol had good effects, diminishing the cough and expectoration, modifying the sputa, lessening the sweats, and restoring sleep and appetite; but it was much less useful and sometimes injurious in more acute cases, more nearly approaching the type of phthisis florida.

The solutions of carbolic acid administered subcutaneously, and the same combined with iodine, produced surprising results. At the outset, however, the progress was slow, but the improvement continued, and even in unfavorable cases the results have been highly satisfactory—for not only in respect to the rational signs of phthisis has the most marked improvement taken place, but the *bacillus* is gradually made to disappear.

Dr. Ley concludes as follow: The pure mineral oil, now known as the *oil of medicinal vaseline*, is a very useful vehicle for making solutions to be employed subcutaneously. The oil of *arachides* (?) is, of all vegetable oils, the best adapted to the same purpose.

Of the medicaments subjected to experimental trials, iodine and carbolic acid occupied the first place, eucalyptol and sulphide of carbon coming after.

The injections containing eucalyptol had the strength of 20 to 50 per 100. The medium dose is 60 to 75 centigrammes (about 10 to 15 grains). After fifteen to twenty days use of the remedy, an intermission of a few days is desirable, or for the eucalyptol some corresponding remedy may be substituted, such as terpinol, terebinthin, etc.

Eucalyptol administered hypodermatically is quickly absorbed, and is eliminated largely by the lungs, but some accumulation takes place in the system, a fact that must be kept in mind. It does not affect the fever of pulmonary tuberculosis, but acts on the bronchial mucous membrane, and exerts a distinctly curative influence in the catarrhal affections of the bronchi. Its action is local, but it does not affect tubercle. Carbolic acid is a more efficient antiseptic, and when combined with iodine, has a very pronounced effect on bronchial catarrh.

In grave cases, better results are had from the administration of iodine and carbolic acid, the effects of which are uniform and persistent.



## EFFECTS OF IODIDE OF POTASSIUM ON THE ASSIMILATION OF NITROGENOUS MATERIALS.

Contradictory opinions have been expressed as to the action of iodide of potassium on the assimilation and metabolism of nitrogenous matters. Bock long ago (1869) maintained that it has no effect of this kind, but subsequently Smirnow demonstrated that it does promote the disassimilation of nitrogenous substances. Recently SAMOÏLOW has examined the question anew (*Thesis of St. Petersburg*, 1886) by a series of laboratory experiments, dogs being used for the purpose, and he concludes that small doses of potassium iodide promote the function of assimilation, but large doses act in the opposite manner, increasing the destructive metamorphosis of the nitrogenous tissues or materials. No doubt the waste caused by this agent may be in part due to its action on the mucous membrane—to the swelling and desquamation of the epithelium and thrombosis of the smaller vessels of the kidneys—hence Samoïlow holds that the large doses of iodide of potassium recommended by Keyes are dangerous.

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## EFFECTS OF ALCOHOL ON THE DIGESTIVE FUNCTIONS IN THE NORMAL AND IN THE PATHOLOGICAL STATES.

DR. A. GLUZINSKI has examined anew this much debated question (*Deut. Archiv f. klin. Medicin*, vol. 39, 1886). His conclusions are as follows:

Alcohol disappears rapidly from the stomach. Two phases of the effects on digestion are to be noted: in the first, there is a marked diminution in the power to digest albuminous substances; the second phase commences after the elimination of the alcohol, and during this period the functional activity of the stomach is such that digestion is completed somewhat earlier than in the normal state. Alcohol in the first phase, inhibits the activity of pepsin, but, on the other hand, stimulates the gland elements, in consequence of which during the second phase there is a more abundant production of hydrochloric acid. Dr. Gluzinski finds, therefore, that a small amount of alcohol exerts a favorable influence on the digestion of healthy persons.

In diseased states, after the absorption of a certain amount of alcohol, the two phases of digestion are much less pronounced, and hence the use of alcoholic drinks is not to be recommended in such morbid conditions of the digestive apparatus as dyspepsia.

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## PILOCARPINE IN CATARRH OF THE TYMPANUM.

KOSENGARTEN has recently reported the good effects obtained by him in catarrh of the middle ear, by subcutaneous injections of pilocarpine (*Zeitschrift für Ohrenheilkunde*, 1886, vol. xiv., quoted in *Bull. Gén. de Thérap.*, April 15, 1887).

Politzer was the first to call attention to the use of pilocarpine in recent affections of the labyrinth, and these observations were confirmed subsequently by Moos and Wolff, and still more recently by Jacobson. Kosen-garten conceived the notion of making pilocarpine injections in chronic troubles of the middle ear, and they have proved to be highly useful.

## THE HYPODERMATIC INJECTION OF THE INSOLUBLE SALTS OF MERCURY.

The treatment of syphilis by the subcutaneous injection of mercurial salts yet remains an undecided question. In an elaborate historical and critical review of the subject, DR. GUELPA seeks to establish some principles for more accurate guidance (*Bul. Gén. de Thérap.*, April 15, 1887).

The method of Scarenzio, set forth in his great work, has been the point of departure in recent times in the therapeutical applications of mercury subcutaneously. Calomel and the yellow oxide are the mercurial salts employed by him, and his conclusion was that the hypodermatic method is superior to friction or fumigation. The next most important contributions to the subject were made by SMIRNOFF, who occupied himself with determining the best site for the injections, as well as the general principles applicable. Smirnoff advises that the depression in the hip behind the great trochanter be selected for the operation, because here the areolar tissue is abundant, loose, and extensible. Suitable care taken, abscesses do not form, and the pain and discomfort are reduced to the minimum. If mercurialism occur, Smirnoff holds that it is due to impure air, and the mercurial vapor generated in an apartment occupied by many subjects undergoing the mercurial treatment. It follows that careful attention to ventilation and to the supply of pure air becomes necessary to success.

Smirnoff concludes that the hypodermatic method is required where prompt results are necessary; that it is contraindicated when mercurial periostitis has appeared; that it is the most convenient and simple of the methods used; that it is applicable to all ages and stages of the disease; that it is superior in efficacy to the treatment by inunction, and more active than any other mercurial plan.

Dr. Guelpa, in concluding his memoir, states that he has not yet attained to a final conviction on the subject, but he expresses the opinion based on an unprejudiced examination of the question, that the hypodermatic injection of the salts—especially, perhaps, of the insoluble salts of mercury—must be regarded as a method of treating syphilis of general utility, and in a special case incontestably superior to all other plans.

## THE PREVENTIVE TREATMENT OF SYPHILIS.

PROF. NEUMANN has recently published the results of his clinical work in this department (abstracted in the *Bull. Gén. de Thérap.*, Feb. 15, 1887). The so-called "preventive treatment" consists in excision of the induration and mercurial inunctions. Neumann finds that extirpation of the local disease does not prevent general infection, nor does the mercurial inunction prove more efficient in this respect.

The expectant treatment is rejected by him because of the great length of time required, because such subjects continue to be a source of infection, and because the ulterior accidents are often very serious in character.

FINGER, of Vienna, although regarding excision as possibly successful, thinks it hazardous on the whole. He is opposed to the preventive method and expectancy, and still maintains the superiority of iodine and mercury in the treatment of all the manifestations of syphilis.

## TREATMENT OF NEURALGIA OF THE FIFTH NERVE.

PROF. GUSSENBAUER (*Prag. med. Wochenschrift*, No. 31, 1886, quoted) remarks that trigeminal neuralgia is very frequently a reflex action proceeding from the intestines in the course of an obstinate constipation. In 33 cases under his observation there were but 3 requiring surgical interference, and in the others cures were obtained by methodical treatment of the constipation. In most of the cases sensible amelioration occurred in about fifteen days of the treatment. The measures employed consisted in cold enemata, fomentations, and cold frictions of the abdomen.

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## COCAINE IN CARDIAC ASTHENIA.

NOORDEN (*Berliner klin. Wochenschrift*, No. 51, 1886) has had good results (*véritablement merveilleux*) in pseudo-angina pectoris by the use of cocaine. He offers no explanation of its utility, but compares its action in these cases to that obtained by Bescharner in bronchial asthma.

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## THE FORMIATES AND THEIR DISPOSAL IN THE ORGANISM.

MM. GRÉHAUT AND QUINQUAD publish in the *Archives de Physiologie*, April 1, 1886, an elaborate research on the disposition made of the formiates when introduced into the body. (*Recherches sur les Formiates Introduits dans l'Organisme.*) It will suffice to give their conclusions. Although not a matter of immediate practical importance, the facts may serve to explain, or suggest by analogy, how similar substances act under corresponding conditions.

MM. Gréhaut and Quinquad conclude that when formiate of soda is introduced into the digestive canal or thrown into the blood, it is eliminated by the kidneys without undergoing decomposition, and that the urine contains no more than the usual proportion of carbonates.

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## HOT WATER IN ACUTE PROSTATITIS.

DR. CAZEAUX (*Thèse de Paris*, 1886) finds that hot water enemata and applications to the perineum are very effective at the onset of prostatitis and before the occurrence of suppuration. He advises water at the temperature of 130° F., to be used by the irrigator three times a day to the perineum and in the rectum.

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## MASSAGE IN SCIATICA.

PROF. MAX MÜLLER advocates the methodical use of massage in sciatica. (*Deut. medinis. Wochenschrift*, No. 24, 1886.) Of a group of fifteen patients of varying ages, he succeeded admirably in all by this treatment. All of them were severe cases, having intense pain and considerable disorder of motility. Massage was applied in the ordinary way, the patient lying on the healthy side. The first *séances* were painful, but the irritability of the nerves rapidly subsided, and after a few treatments no pain was caused by it and permanent relief was obtained.



## SPARTEINE.

This new cardiac remedy, so much praised by Prof. Germain Sée, has been studied by DR. STOESEL, of Vienna, and his observations appear in the *Centralblatt für die gesammte Therapie* of April, 1887.

After a statement of the opinions given by Sée, Dr. Stoessel narrates his own experiences. In respect to the value of sparteine in the condition of arrhythmia of the heart, due to weakness of the heart-muscle, he does not agree with Prof. Sée, who maintains that it is superior to digitalis here. Especially does Dr. Stoessel find sparteine inferior to digitalis in the irregular rhythm and weakness due to fatty degeneration of the heart.

Another fact, showing the superiority of digitalis, is that this remedy is an efficient diuretic, while sparteine has little or no action on the kidneys.

## SALOL.

In the *Therapeut. Monatsh.*, p. 47, 1887, Bielchowski publishes the results of his experience with salol in acute rheumatism. In the quantity of 5 grammes a day (75 grains) it acts promptly in arresting the disease, and, when a relapse occurs, a single dose will usually prove immediately successful.

Rosenberg has also employed it with complete success. Its advantages are, that it does not disturb the digestive organs, and is not difficult to administer; but the chief point is, the curative power, which is so much greater than the salicylates have, but there is no evidence to show that it succeeds better than other agents in preventing the cardiac complications.

We submit some further observations on salol, that our readers may have the data for forming correct conclusions. A full abstract from a paper by DR. FR. EDUARD GEORGI, is published in the *Centralblatt für die Therapie* for April, 1887, from which we obtain the facts here given.

As regards the topical use of salol, Dr. Georgi did not find it superior to the remedies now employed for the relief of nasal and pharyngeal diseases. By the stomach it may be given in doses of 10 to 30 grains without inconvenience. In a case of febrile icterus it had a rapid effect, both in reducing the fever and clearing up the jaundice. It proved to be effective in lessening the temperature of the phthisical also.

In pyonephritis, cystitis, etc., it was found to be very active in checking suppuration; and preventing and removing the products of decomposition of the urine.

In acute rheumatism Georgi ascertained it to be exceedingly valuable, one or two doses often relieving the pain entirely, and in all cases relief was obtained in two or three days. Two grammes (30 grains), in the twenty-four hours, were found to be sufficient, and it was rarely necessary to administer more than ten to twelve grammes (150 to 180 grains), in all, to effect the removal of the rheumatic pains. When this was accomplished, the dose was reduced to 15 grains a day until complete recovery. Relapses were not frequent. The largest dose given caused no unpleasant sensations, and only in three out of twenty cases was buzzing in the ears brought on. Weakness of the heart, small pulse, or indications of collapse, never occurred. As an antipyretic in febrile disease salol proved to be certain in its action and

powerful, but massive doses are necessary—from 30 to 60 grains. Unlike the other antipyretics of this group, salol induced but moderate perspiration.

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IODOL AND IODOFORM.

SCHNIRER makes (*Semaine Médicale*, 1886, p. 406, quoted by *Bull. Gén. de Thérap.*, February 15, 1887) some observations on the comparative utility of iodoform and iodol.

As the odor of iodoform is so strong, diffusive, and penetrating, iodol is a happy substitute, since it has but little taste or odor. It is a brown powder, which may be used topically, or taken internally, in the quantity of 25 to 50 centigrammes (4 to 8 grains). Experience has confirmed the original statements as to its utility. It is equally effective with iodoform, and can be substituted for the latter in the whole range of the topical uses, and probably, also, for internal administration.

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CHLORHYDRATE OF PÉREIRINE.

In a recent communication (*Bull. Gén. de Thérap.*, April 15, 1887) Dr. FERREIRA, of Brazil, calls attention to the power of *chlorhydrate of péreirine* in the cure of malarial infection. This alkaloid is obtained from a member of the Apocynaceæ, which grows spontaneously and in great abundance in Brazil. The dose prescribed by Dr. Ferreira is two grammes (about 3ss), in two parts, at a half-hour interval. He finds it an efficient antiperiodic, less irritating to the stomach than quinine, and sometimes successful when quinine has entirely failed. It appears to be more useful in the acute cases.

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MEDICINE.

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ON SOME CASES OF INFECTIOUS CEREBRO-SPINAL MENINGITIS, WITH  
REMARKS ON THE DIAGNOSIS OF THE DISEASE.

SENATOR (*Charité Annalen*, xi. 248, 1886) reports eight cases of this affection, and emphasizes the difficulty attending its diagnosis. The disease can be most easily confounded with typhoid fever, tetanus, and with other forms of meningitis cerebro-spinalis. But even in cases of cerebral hemorrhage into the meninges or ventricles, where decided stiffness of the neck is com-

bined with spasm and contractures of the extremities, a confusion with cerebro-spinal meningitis may arise, especially as absence of the tendon reflexes is observed in severe cases of the latter affection.

Acute rheumatic arthritis of the articulations of the vertebral column, narcotic poisons and those producing spasm, uræmia, diabetic coma and the nearly allied coma of other dyscrasic conditions, are also to be borne in mind in forming a diagnosis. The previous history of the disease in each case is of the greatest importance, since in other disorders the symptoms usually do not occur in the same order as in cerebro-spinal meningitis. At the height of the disease there are to be observed a stiffness of the neck, various eruptions of the skin—especially herpes, fever, and sweats which are not critical. The swellings of the joints, which develop later in the disease, are of diagnostic import. In one case it was observed that the diazo reaction was absent. This feature, if confirmed, would be of importance as distinguishing the disease from typhoid.

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#### MOUNTAIN FEVER.

In a "Report on the Topography, Botany, Climatology, and Diseases of Surprise and Goose Lake Valleys, California," by KOBER, we find a short notice of mountain fever. He says that it differs essentially from the clinical pictures of enteric and remittent fevers, and represents, he believes, a union of the typhoid and malarial poisons. The disease is ushered in by a chill or chilly sensation, repeated during two or three days. There is some aching of the head and of nearly every part of the body. The tongue is covered with a thick yellowish or bluish fur, but with the borders and tip clean and red. Often there is slight pharyngeal and nasal catarrh. The temperature reaches 101°–104° F., and in the first stage of the disease especially exhibits marked exacerbations and remissions, suggestive of quotidian and remittent fevers. The pulse is 90–110 and full; epistaxis and abdominal symptoms are rare in the early stages; there is no eruption; herpes is common; sweating more common than in typhoid. The fever continues four or five weeks, and in the graver forms abdominal and adynamic symptoms develop. Early treatment usually cuts the disease short; but if neglected, it runs into the typhoid stage and quinine has no curative influence. He has often seen the disease attack men who have lived in places where it seems impossible that the typhoid germ could have existed. He thinks it likely that this was obtained from the pollution of some of the mountain streams by beaver dams and large game. The author agrees with Hoff (AMER. JOURN. MED. SCI., for January, 1880), who, following Woodward, calls the affection typho-malarial fever, and believes that it is a hybrid disease—*i. e.*, typhoid, modified by intermittent. He says that it begins as an intermittent, and that this stage is followed in two weeks by the typhoid stage, which lasts about four weeks, and exhibits the typical typhoid symptoms. A postscript by Woodward confirms him in the statement that necropsies almost always reveal the lesions of typhoid.

This would seem to be conclusive, but it is but right to say that opinions are somewhat divided. SMART (AMER. JOURN. MED. SCI., 34, 1878) claims that mountain fever is only a malarial remittent with adynamic tendencies. HIRSCH (*Handb. of Geog. and Hist. Path.*, Eng. transl., 1883) refers to it as a



variety of malaria. There is also some unfortunate confusion in the name employed. SQUIRE, in the last number of this journal, describes typho-malarial fever as malarial fever which has assumed the adynamic type present in typhoid fever, and applies the name "malarial enteric" to those cases in which there is a union of both diseases, as seems to be the case in mountain fever.

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THE MICROÖRGANISMS IN THE VARICELLA VESICLE.

GUTTMANN (*Virchow's Archiv*, B. cvii. H. 2, 259) has investigated the contents of the vesicles in three cases of varicella, with regard to the presence of bacteria. In cultures made upon agar-agar, he discovered three varieties of cocci: 1st, the *Staphylococcus aureus*; 2d, one which he names *Staphylococcus viridis flavescens*, which is characterized upon the culture medium by a color at first resembling that of an unripe lemon, and later becoming more yellow. It is never white; 3d, a coccus exhibiting on agar-agar culture a white color.

Inoculations of these cultures upon animals were without result, except in the case of the *Staph. aureus*, which proved fatal in one instance. Guttmann believes that cocci of various other species may occur in the varicella vesicles, and refers to a species previously reported by Bareggi.

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PERIPHERAL NEURITIS.

In discussing this subject in the *Brit. Med. Journal*, 1887, p. 6, Ross says that the symmetrical manner in which the disease usually attacks the body shows that at least in the majority of cases it is produced by some poison in the blood. Thus salts of lead, arsenic, and probably of copper and other metals are capable of giving rise to it. In a second group of cases the disease is caused by alcoholic excess, the fumes of bisulphide and oxide of carbon, and probably by the abuse of chloral and chloroform. It has also been observed in advanced diabetes. A third variety arises from animal poison. Diphtheritic paralysis is the best known instance of this. It is also to be observed in syphilis, smallpox, scarlet fever, measles, typhoid, typhus, intermittent fever, dengue, tuberculosis, leprosy, and beri-beri. It is probable that it may be caused by rheumatism, and that the wasting of the extensors seen in chronic rheumatoid arthritis is due to a neuritis of the neighboring nerves. There is also an *idiopathic* multiple neuritis.

The symptoms consist in more or less widely distributed atrophic paralysis. Ross has never been able to assure himself that active spasm preceded the paralysis in any case. The condition of the cutaneous reflexes varies. With a very few exceptions, the patellar reflex has been wanting in all recently reported cases of alcoholic, diphtheritic, and other forms of neuritis of the lower extremities. The knee-jerk is sometimes absent in lead poisoning, even when the muscles of the lower extremities are not appreciably involved. Yet the failure of the patellar reflex is a valuable but not an absolute sign of neuritis. The electrical test affords conclusive evidence in the majority of cases. The faradic excitability of the affected nerves and muscles is lessened or abolished, and the reaction of degeneration is detected with the galvanic current. The paralysis affects especially the extensors, as is well seen in the "wrist-drop" of lead palsy. That following alcohol, bisulphide of carbon, the animal poisons, and even arsenic, usually attacks the extensors of the lower extremi-

ties first. Paralysis of the extensors of the forearm soon follows in alcoholic neuritis, then the thighs and upper arm, then the flexors of the leg and forearm, and finally even the muscles of the trunk may become involved.

In diphtheritic paralysis the soft palate is the first to be affected; then the muscles of the eye, and after some time the lower extremities. The arms are seldom involved.

The paralysis of the extensors in neuritis produces a temporary or permanent flexion of the limb, simulating a spasm of the flexors.

The sensory disturbances accompanying the paralysis resemble considerably those of locomotor ataxia.

The disease may most easily be confounded with chronic poliomyelitis, Landry's paralysis, and locomotor ataxia. From the first it is distinguished by the presence of well-marked sensory phenomena, and by the order in which the muscles are attacked. From the second it differs in exhibiting the reaction of degeneration with marked sensory disturbances and wasting of the muscles. From the third it differs in many respects, but the character of the gait is sufficient to distinguish it. We observe, namely, in neuritis a peculiar elevation of the knee in walking, with a drooping of the toes, and an unusual exposure of the sole of the foot to one standing behind the patient. Such a case is unable to elevate the toes if sitting on a chair with the soles flat on the floor.

As regards the pathological anatomy of the disease, the author shows that opinions are now generally agreed that the lesion is seated in the nerves themselves and not in the cord.

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#### ON PSEUDO-TABES FROM ARSENICAL POISONING.

DANA (*Brain*, xxxvi. 456, 1887) reports two cases and makes a careful study of the literature of arsenical paralysis, appending over 100 references. He concludes that there are two forms of this, just as there are of diphtheritic and alcoholic paralysis.

1. The ordinary arsenical paralysis, in which the motor affection and the atrophy are more marked than the sensory derangement.

2. Arsenical pseudo-tabes, in which there is no pronounced motor paralysis, but decided sensory disturbance, especially ataxia.

It is entirely improbable that either of these forms is due, as a rule, to a diffuse myelitis, but rather to a multiple neuritis; just as is the case in paralysis from lead, alcohol, diphtheria, and probably from other infections and poisons.

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#### ON THE EARLY RECOGNITION OF GENERAL PARALYSIS OF THE INSANE; AND THE RELATION BETWEEN THIS DISEASE, TABES DORSALIS, AND DISSEMINATED SCLEROSIS.

J. SYER BRISTOWE, in an address reported in the *British Medical Journal* for 1887, p. 1, states that, although typical cases of general paralysis are easily diagnosticated, yet, in many instances, especially in the early stage, at a time when a diagnosis is so much to be desired, the recognition of the nature of the disorder is difficult, if not impossible.

He gives a synopsis of the symptoms, mentioning the fact that epileptiform attacks and other mental derangements may occur in all these disorders. In

general paralysis of the insane the paralytic symptoms are most pronounced in connection with the organs of speech. The usual duration of the disease is said to be two or three years, but it is probable that early indications, consisting of slight degrees of some of the characteristic phenomena, may be detected by the careful observer years before the first outspoken symptoms become noticeable.

Bristowe reports a series of interesting cases of general paralysis, illustrating the occasional difficulty of diagnosis. In one patient, for example, with fairly characteristic signs of general paralysis were associated symptoms both of tabes and of disseminated sclerosis. In this and in several other cases delusions never occurred. He then describes three cases, probably of locomotor ataxia, in which, however, there was so much mental disturbance that the diagnosis might be open to question.

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#### SUDDEN DEATH IN PLEURISY.

WEILL (*Rev. de Méd.*, 1887, 33-64) reports a case of sudden death in pleurisy, and gives the notes of twenty-six others gathered from the literature, and which seem to him to fill the conditions of an *exitus* truly sudden. He excludes all cases of death from increasing asphyxia lasting some hours; and omits, too, all those in which thoracentesis had been performed, and death followed immediately or more remotely. His conclusions are as follows:

1. Sudden death in pleurisy appears to be associated with certain lesions, of which the principal are—thrombosis or embolism of the heart and of the pulmonary artery; sudden œdema of the lung on the side non-affected with pleurisy; alterations of the myocardium. These last often escape notice at the autopsy, since they demand the aid of the microscope for their detection. In some cases no cause at all can be found.

2. Cases of death attributed to simple functional trouble, such as severe syncope; or to mechanical interference, as displacement of the heart, torsion of the vessels, the bending of the ascending vena cava at a right angle; or to hypothetical lesions, as capillary embolism of the brain; ought to be admitted with great reserve.

3. Sudden death may occur in the most diverse varieties of pleurisy. The affection may be on either side (oftener the right); acute or chronic; with the effusion increasing, stationary, or decreasing. The liquid is usually serous.

4. Pleurisy ending in sudden death may or may not be accompanied by peculiar symptoms. There may be increase of dyspnœa, premonitory syncope, and irregular pulse. Very often death occurs when the case appears to be making most satisfactory progress. It is usually produced by some sudden effort.

5. Treatment is, of course, useless, when we have to do, for example, with lesions of the myocardium. The prophylactic treatment in other cases is thoracentesis. It is indicated either in the acute or chronic stage if threatening symptoms be present, or if there be increase of the intra-pleural pressure.

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#### ON CASES OF VALVULAR DISEASE OF THE HEART, EXISTING FOR OVER FIVE YEARS WITHOUT SERIOUS SYMPTOMS.

SIR ANDREW CLARK (*Brit. Med. Journ.*, 260, 325, 370, 1887) extracts from the clinical histories of his office patients since 1873, 684 cases in which there



existed well-marked chronic valvular disease of the heart, not indicated by any symptom, and not interfering with the patient's health. A series of elaborate tables accompanies the text. Concerning the diseases for which the patients were receiving treatment, it appears that nearly one-half were affections of the digestive system, and about one-fifth diseases of the nervous system.

The author relates, by way of illustration, a number of very interesting and instructive cases, not included in the tables, showing that the evidences of the gravest cardiac lesions could coexist with excellent health.

Many of the patients had been told by physicians previously in attendance that they could live but a short time. To others the strictest rules of diet and of exercise had been given, with the result that both health and happiness suffered greatly. For all of these cases, Clark recommended a return to the ordinary hygienic *régime* necessary for the physiological conditions of life. He warns us, however, that this is only suitable to chronic and stationary cases. When the heart is irritable, irregular, or frequent; when the murmurs vary in character and intensity, or when there is any febrile action, patients must be kept at rest, and the lightest diet administered. Any other course is most unsafe.

The author next reports several cases showing that well-established cardiac lesions having lasted several years, and due to inflammation of the valves, may in later years entirely disappear. This may be observed in the case of the mitral bruit often heard in chorea, and dependent on organic changes. These murmurs of chorea, in fact, usually disappear eight or nine years after the attack. The same disappearance of all evidence of disease can often be observed years after a rheumatic endocarditis had produced a loud systolic murmur. Although such recoveries are often seen in the young, yet they sometimes take place in the old, and the author quotes cases in substantiation of this fact. Even well-marked valvular defects of a degenerative nature may in rare cases disappear. There must be *differentiæ* between the histories, habits, surroundings, occupations, etc., of those who suffer and die of heart disease, and of those who are not in the least incommoded by its presence.

According to Clark, the factors necessary in mitral disease for the exemption from unpleasant cardiac symptoms, and for the continuance in the duties and enjoyments of life, are as follows: 1, good general health; 2, just habits of living; 3, no exceptional liability to rheumatic or catarrhal affections; 4, origin of the valvular lesion independently of degeneration; 5, existence of the valvular lesion without change for over three years; 6, sound ventricles with moderate frequency and general regularity of action; 7, sound arteries, with a normal amount of blood and tension in the smaller vessels; 8, free course of blood through the cervical veins; 9, freedom from pulmonary, hepatic, and renal congestion. The prognosis in aortic disease is not so favorable even under the same conditions.

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#### ON THE GENERAL PATHOLOGY OF HEART DISEASES.

We make the following extracts from the posthumous paper of SCHOTT on this subject (*Zeitsch. f. klin. Med.*, B. xii. H. 4, 295):

*Insufficiency of the heart muscle.* This may be *absolute* or *relative*. In *absolute* insufficiency there is no obstruction to the circulation, but an absolute

diminution of muscle power. The heart muscle, like other muscles, is subject to atrophic changes from improper nutrition, lack of bodily and mental exercise, accumulation of fat, etc. "Fatty heart" can be cured without any loss of weight; but the usual treatment of obesity may act very injuriously on the heart by affecting the general nutrition. In very fat persons of great bodily and mental energy the heart retains its strength, as do other muscles. In purely *relative* insufficiency there is some obstruction to the circulation, but the heart muscle preserves its normal power. In reality, however, relative insufficiency is almost always combined with some loss of muscular strength. Complete compensation may exist or become developed.

*Dilatation.* Of this he makes two classes:

1. Dilatation which necessarily accompanies certain valvular lesions. This, with muscular hypertrophy, forms an essential factor of the compensation. It may be called "compensatory dilatation." It is exemplified in the left ventricle in aortic and mitral disease.

2. The second form is characteristic of diseases of the muscle substance and of insufficient compensation. It is only the expression of an engorgement of the heart with blood, and might be named "dilatation of engorgement." It is very well represented by dilatation of the right heart following valvular disease of the left side, and by that of the left heart due to renal disease. It is produced by an imperfect emptying of the ventricle during systole. Dilatations of this form disappear with the development of complete compensation. After a few minutes of proper gymnastic exercise, the percussion boundaries of the heart sometimes become lessened. On the other hand, various causes may visibly increase the dilatation, as shown by the cardiac dulness.

*The cardiac murmurs.* In numbers of cases murmurs which were judged to be organic disappeared after a time. This is a strong proof that there had been no anatomical lesion. The sudden appearance and disappearance of murmurs may very often be observed. A murmur may sometimes be made to vanish in a few minutes through the diminution of dilatation produced by light gymnastics. The transition from mitral murmur to a divided (gespaltene) tone, which is often detected, is a probable proof of an abnormal action of the papillary muscle and of the absence of a valvular lesion. The author admits, however, that a recent mitral insufficiency due to endocarditis may, in rare cases, really heal. There exists an aortic insufficiency from dilatation of the aorta through high arterial tension. This murmur may disappear; but the author doubts whether true aortic insufficiency ever is curable.

*Peripheral passive congestion and hydrops.* Diminution of the amount of urine is a necessary result of heart disease, but need not be attended by dropsy. But when, through thirst, an increased quantity of fluid is brought into the system, hydrops appears. This increased thirst is induced by the retention in the blood of the solid elements of the urine. In other instances growing weakness of the right ventricle produces a like result. In all cases the progress of the circulatory disturbance is aided by the passive hyperæmia of the kidneys; and although the heart may grow stronger through treatment, the kidneys remain affected, and we find a clinical picture closely resembling that of contracted kidney. Great and painful increase in the size of the liver due to engorgement occurs early, even before any œdema or albuminuria appears;

but may be strikingly diminished by suitable gymnastics. The congestion of the lungs, liver, stomach, etc., is often much relieved by the development of œdema of the subcutaneous connective tissue. When the condition of engorgement becomes extreme, an element of inflammation is added. The pulmonary hyperæmia becomes splenization, the hydrothorax exhibits friction sounds, and erysipelas is very apt to appear.

#### NEW INVESTIGATIONS ON THE GALLOP RHYTHM.

CUFFER and BARBILLION publish a long article in the February and March numbers of the *Archives Générales de Médecine*, 1887, in which they describe the gallop rhythm as made up of two normal heart sounds, to which is added a third abnormal one separated from them by an interval longer than in the case of a simple reduplicated beat. They draw the following conclusions:

1. A more complete classification of the varieties of gallop rhythm can be made than that at present adopted.

2. Gallop rhythms are *diastolic* or *mesosystolic*, according to the place which the abnormal bruit occupies in the cardiac cycle. In the first it immediately precedes, and in the second it immediately follows the cardiac impulse.

3. The diastolic gallop may itself be subdivided, according to whether it is produced in the *left* or the *right* heart.

4. The left diastolic gallop may be *permanent* or *transitory*; having in each case a different pathogenesis.

5. The permanent left diastolic gallop is due to a hypertrophy of the left ventricle, itself a result of a reflex influence from disease of the kidney; or of a permanent increase of arterial tension caused by a chronic nephritis or general arterio-sclerosis.

6. The additional beat is presystolic. It is a bruit of diastolic tension, caused by the blood forcibly entering, during systole, a rigid and unyielding left ventricle.

7. If the superadded sound is heard very close before the first normal sound, it is an evidence of concentric hypertrophy without dilatation. When it is separated by a longer interval, and tends to approach the second sound of the preceding cycle, it is an indication of dilatation, and the prognosis is more unfavorable.

8. Transitory left diastolic gallop is observed in acute affections of the kidneys, or in exacerbations of chronic affections. There is a spasmodic state of the cardio-arterial system, with a resulting transitory high tension.

9. Right diastolic gallop is produced by a reflex action from some gastric, hepatic, or intestinal disorder, exciting a spasm of the arterioles of the lungs, with an increased tension in the right heart. This increased tension causes the abnormal bruit in a manner analogous to its production in the left heart.

10. The mesosystolic gallop rhythm is characterized by an additional sound occupying the shorter silence.

11. There exist all grades of this, between the simple prolongation of the first sound and the most clearly marked reduplication.

12. It is the index of insufficiency of the cardiac systole which is sometimes slow and languid, sometimes acting twice to enable the ventricle to expel the blood which it contains.



13. The writers have met this variety of gallop rhythm in several cases of typhoid fever, in one of tuberculosis, and in one of mechanical interference with the heart. It might be met with wherever the heart is failing from any cause.

Finally, they reiterate that the diastolic gallop is a bruit of cardiac *strength* with *high* arterial tension, and the mesosystolic an *asthenic* bruit with *feeble* tension.

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#### MORPHINE IN DIABETES.

T. MITCHELL BRUCE (*Practitioner*, 1887, 20) was induced by his success with morphia in the treatment of a series of cases of diabetes, to study from a therapeutic standpoint some of the still unsolved questions concerning the pathology of the disease. By administering morphia *per orem* to a selected case, and thus reaching the liver through the portal circulation, the glycosuria was made to disappear. When as large doses of the drug as the patient could bear were given hypodermatically, almost no effect on the elimination of sugar was obtained. The author concludes that, in the case in question,

1st. The glycosuria was due to an increased ingress of sugar into the blood; not to a diminished destruction of it in the system, else the hypodermatic use of morphia would not have been without effect.

2d. The increased ingress of sugar was not caused by a simple transportation of sugar from the intestine or portal vein to the general circulation, inasmuch as it continued unabated when an exclusively animal diet was employed.

3d. The excessive glycosuria going on in this case was effected mainly, or entirely, in the liver; not in the muscles or the other viscera. For (*a*) when the morphia was introduced into the liver by the portal vein it reduced the sugar to *nil*, but had little effect on the other viscera, while (*b*) when introduced into the general circulation hypodermatically, it diminished the amount of sugar but little, but had a decided effect on the other viscera, especially the central nervous system.

4th. In this instance if the diabetes was of nervous origin, the seat of the process appears to have been at any rate in the liver, not in the central nervous system.

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#### THE OCCURRENCE OF ALBUMINURIA IN DIABETES.

Incited by the statement of Stokvis, that albuminuria is a very common complication of diabetes, POLLATSCHEK (*Zeitsch. f. klin. Med.*, B. xii. H. 1, 379) undertook some investigations on the subject. He found that of 2877 persons whose urine was examined in one of the chemical laboratories in Carlsbad, 1187 had glycosuria, and 437 of these latter had albuminuria also. Or, in other words, 37 per cent. of the cases of diabetes had albumen in the urine. He found, too, that albumen occurred oftener in urine that contained over 0.5 per cent. of sugar.

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#### ON THE "STARCH-CONVERTING" FERMENT IN HUMAN URINE.

BEUSING publishes in *Virchow's Archiv*, B. cvii. H. 1, 186, his experiments relating to the statement of Holovtschiner made in April, 1886, that there existed in urine a ferment capable of transforming starch into dextrine and sugar.

He mixed equal portions of urine and of a one per cent. starch solution, and subjected them to a temperature of  $37.5^{\circ}$  C. for twenty-four hours or less. Although he found at the end of this time that the starch had completely disappeared, he was in no instance able to detect sugar by any test employed.

In Trommer's test the suboxide of copper was, it is true, precipitated *after* boiling for some time, but the author properly considers this no proof of the presence of glucose. Although the experiment was modified in various ways, and the urine, both of healthy persons and of those suffering from various diseases, was utilized, the result was always the same.

It was interesting to observe that the starch-converting agent was present in the urine of diabetic patients. It was also detected in the fluid aspirated from a case of ascites.

Breusing is of the opinion that the ferment converts the starch only into one of the substances produced before the final change into glucose takes place.

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#### ON THE CORRELATION OF THE SECRETA AND EXCRETA OF THE ORGANISM.

At the suggestion of Professor Riegel, STICKER and HÜBNER (*Zeitsch. f. klin. Med.*, B. xii. H. 1 and 2, 114) have attempted to discover whether the absence of free hydrochloric acid in the gastric contents in cases of carcinoma of the stomach, could be explained in any way by testing the degree of acidity of the urine at different hours in the day. After a series of extended researches they reach the following conclusions:

1. The reaction of the urine is subject to physiological variations, which show a constant dependence on certain processes going on in the organism.

2. The most important of these, in this connection, is the secretion of the digestive juices, especially those of the stomach and pancreas. Muscular action, and perhaps menstruation and psychical action, is of less importance.

3. If the various processes referred to are not going on, the urine preserves during this time and without variation the usual mean of the acidity of the twenty-four hours.

4. The absolute acidity of the urine passed during the twenty-four hours is constant for each individual under an approximately uniform state of the nutrition. It varies for different individuals, both in physiological and pathological conditions.

5. The acidity of the urine is chiefly or entirely dependent on the formation of free hydrochloric acid in the organism, and its retention there. If it is artificially or accidentally (as by vomiting, etc.) removed, the urine suffers as regards its absolute acidity.

6. The graphic curve, showing the variations of the acidity of the urine at different hours in the day, is in consequence of the predominating influence of hydrochloric acid in the reaction of the urine, in a certain sense the expression of the intensity of the digestive power of the stomach.

7. This curve has, however, no semeiotic value in pathological conditions, since other processes in the organism, especially the secretion of the pancreatic juice, may disturb or destroy its typical appearance.

ON DIGESTIVE FERMENTS IN NORMAL AND PATHOLOGICAL URINES.

Following the investigations of Holvotschiner, who found, both in normal and pathological urine, an amylolytic ferment having the power of converting starch in solution into both dextrin and sugar, BREUSING (*Virchow's Archiv*, vol. 107, p. 186) made a series of experiments, using more exact methods than the first observer for the detection of the sugar.

He found that on mixing varying quantities of a one per cent. solution of boiled starch with urine and keeping the mixture for twenty-four hours at a temperature of  $37.5^{\circ}$  C., no starch was to be found with the iodine test at the end of that time. Iodine gave a brown, yellowish, or rose color when added to the solution. With Moore's test—the only one Holvotschiner had used—a distinct brown coloration appeared, but on more careful examination it was found that this did not arise from the presence of sugar. Trommer's test was reduced only after *boiling* for two to four minutes (glucose reduces it at once and before the boiling-point is reached), and the fermentation test—the most conclusive of all we have for sugar—gave absolutely negative results. No difference could be observed in the action of pathological or normal, or of night or day, urines. To prove that the amylolytic action is really due to the presence of a ferment, Breusing separated the ferment by precipitation with an excess of absolute alcohol, in the usual way, and found that it acted, when alone, upon solutions of starch the same as it did when in the urine. Boiling the urine destroyed its action.

He presumed that in diabetes this ferment might possibly be absent on account of its having been consumed in the body in the conversion of starches to glucose. But the examination of a specimen of diabetic urine, containing 5.8 per cent. of glucose, showed it to act even more powerfully and rapidly than normal urine, indicating the probable presence of a large quantity of this ferment.

[These experiments show that urine contains an amylolytic ferment capable of converting boiled urine into some of the preliminary stages of glucose, namely, the various dextrines known as erythro- and achroo-dextrines, whose presence was denoted by the various colors of rose and yellow and brown assumed by the solution on the addition of iodine, but that the conversion is not carried to the final product—*i. e.*, glucose.]

It is interesting to note, in this connection, that MYA and BELFANTI (*Centralblatt f. klin. Med.*, 1886, No. 42) found that in 28 cases of Bright's disease (4 acute, 24 chronic), the trypsin normally found in urine was invariably absent, while pepsin was nearly always present. In febrile and physiological albuminuria, on the other hand, the trypsin was never absent. This difference might, in doubtful cases, serve as a means of differential diagnosis. The method of determination employed consisted in soaking 2 grammes of fibrin in 500 c. c. of urine for three hours, then pressing out the excess of urine and transferring the fibrin to a 1 : 5 per cent. solution of borax, and keeping it thus at a temperature of  $37.5^{\circ}$  C. for twenty-four hours. The borax solution prevents putrefaction. One-half of the fibrin was used to determine the trypsin and one-half for the pepsin. After a twenty-four hours' digestion, the amount of fibrin remaining after washing and drying determined the amount digested.



## REDUCING SUBSTANCES, OTHER THAN GLUCOSE, IN DIABETIC URINE.

Struck with the discrepancies in the quantitative results obtained by subjecting the same specimen of diabetic urine to the fermentation, the copper-oxide reduction, and polariscopic tests, respectively, LEO (*Virchow's Archiv*, vol. 107, p. 99) endeavored to discover the source of these errors. He succeeded, after removing all the ordinary reducing substances, as uric acid, creatinin, coloring matters, etc., in finding a new substance belonging to the sugar series, and with the power of strongly reducing the copper-oxide solutions, whether as Fehling's or Trommer's tests. This new substance, for which no name has as yet been proposed, is isomeric with glucose. It turns the polarized ray to the *left*  $-26.73^{\circ}$ , and hence, when present, makes the polariscopic readings for diabetic urine indicate a lower percentage of glucose than is actually present. It reduces copper-oxide solutions; 10 c. c. of Fehling's solution corresponding to 0.1242 grain, or one molecule, corresponding to 2.012 molecules of sugar. In using this test, therefore, larger quantities of glucose than are actually present will apparently be obtained. It is not fermentable, and this property distinguishes it from all other sugar-like bodies found in the urine, and at the same time proves the value of fermentation as a test for glucose, for, besides glucose, only levulose, whose occurrence is very rare, is fermentable.

This substance was found in 3 out of 21 cases of diabetes. It did not occur in a large number of normal urines examined.

## SERUM-ALBUMIN IN NORMAL URINE.

POSNER (*Virchow's Archiv*, vol. 104, p. 1) has made careful investigations to settle this much-disputed point, with the result of showing that a minimal amount of serum-albumin is a constant constituent of normal urine. This is important in view of the significance which is attributed by many to the detection of almost infinitesimal quantities of albumin by such delicate reagents as the potassio-mercuric iodide, picric acid, etc. When we consider the constant presence in the urine of albuminoid anatomical elements, it is not surprising that their disintegration and solution should liberate an amount of albumin which, though small, is still appreciable.

## SURGERY.

## IN EUROPE.

## UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,

SURGEON TO, AND LECTURER ON ANATOMY AT, THE LONDON HOSPITAL.

## RECENT SURGICAL LITERATURE.

The last new volume of the *Dictionnaire Encyclopédique des Sciences Médicales* runs from "Uri" to "Ute." The article on the urinary passages is completed. Under the heading of "The General Pathology of the Urinary Passages," M.

ROCHARD discusses retention, incontinence, and extravasation of urine, and urinary abscess. The matter is a little spun out. The paper that follows—"A Monograph on Urinary Fistulæ," by M. MONOD, is the best in the volume. He deals with fistulæ of the kidney, ureter, bladder, and urethra, and with fistulæ in women. The article is very complete and is a masterpiece of elaborate work. A very short paper on calculi, by M. DERBOULLET, deals merely with the general chemical characters of urinary stones. The rest of the volume is taken up with the article "Urines" and the commencement of the series of papers on the uterus.

*Die Allgemeine Chirurgische Pathologie und Therapie*, by Drs. BILLROTH and WINIWARTER (Berlin, 1887). This is a new edition (the thirteenth) of Billroth's well known work on general surgical pathology and treatment. The book has been revised by Dr. Winiwarter and brought up to date. It still remains the best text-book on surgical pathology.

*Études Experimentales et Cliniques sur la Tuberculose*, edited by M. VERNEUIL (Paris, 1887). This is the first fasciculus of a work on tuberculosis and is the outcome of an organized effort to solve the mystery of this affection. It contains papers by a great many authors, and the whole volume is filled with original matter of the greatest value. The papers of the greatest surgical interest are the following: LANNELONGUE, on "External Congenital Tuberculosis;" RECLUS, on "Primitive Tuberculosis of the Scrotum;" VALUDE, on "Ocular Tuberculosis;" DEMARR and VERNEUIL, on "The Generalization of Tubercles after the Ablation of a Primary Tubercular Disease;" VERCHERE, on "The Treatment of Scrofulous Neck."

*Die Typischen Operationen*, by Dr. EMIL ROTTER (Munich, 1887). This is a very compact little work on the chief operations in surgery. It is very ingeniously arranged and is intended in reality to be a handbook.

The chief points of each operation are given clearly and the descriptions are brief but good. The anatomy of each operation is given in detail, and excellent diagrams of the stumps of several amputations are given so as to show the position of the bleeding points.

*Anleitung zur Wundbehandlung*, by Dr. SCHAECHTER (Wiesbaden, 1887). This large work forms a complete treatise upon the treatment of wounds and is a production of conspicuous merit. The author deals in the first place with the pathology of wound-healing and thus introduces the inevitable bacillus. Then follow chapters on sepsis and the complications of wound-healing. The main part of the volume is occupied by the treatment of wounds in general and of wounds of special parts. The list of materials for dressing described under the heading of general treatment is remarkable and alarming.

*Tumeurs de l'Ombilic*, by Dr. VILLAR (Paris, 1887). This is a work peculiar to French industry, a substantial volume on tumors of the umbilicus (excluding hernia). The following is the classification adopted by the author:

*Benign.* Vascular: angioma, lymphocoele. Granuloma: the fungus of the newly born. Adenoma: intestinal, gastric. Cysts: sebaceous, dermoid. Fibro-papilloma. Myxoma.

*Malignant.* Sarcoma, epithelioma, carcinoma.

Nearly ninety illustrations are given. There is an exhaustive bibliography. The illustrations are very poor.

*Die Allgemeine Pathologie oder die Lehre von den Ursachen und den Wesen der Krankheitsprocessen*, by DR. EDWIN KLEBS (Jena, 1887). This is the first volume of an ambitious work (on general pathology or the science of the causes and action of disease-processes). The volume is disappointing because nearly the whole of it is occupied with descriptions of bacteria. The author deals—in the 500 pages of this volume—with such diseases as are conspicuously associated with microorganisms. The work is admirably done and the illustrations are excellent.

*Das Venerische Geschwür, Vorlesungen über dessen Pathologie und Therapie*, by DR. E. LANG (Wiesbaden, 1887). This admirable work on the pathology and treatment of venereal ulcers comes from the pen of a well-known author. The subject is exhaustively dealt with and the chapters on exceptional venereal sores and on differential diagnosis are especially valuable. The author's conclusions are founded upon ample clinical material and a wide experience.

*Über die Excision der Syphilitischen Initialsklerose*, by DR. J. BÖHN (Breslau, 1886). This dissertation discusses the question of the value of excision of the primary sore in syphilis. The author is of opinion that the measure may entirely prevent the development of constitutional syphilis. He allows that the treatment is not always successful, and is unable to give the data upon which the chances of failure may be estimated. The work is of special value as giving a full bibliography of the whole of this vexed question.

*Die Epistaxis und ihre Behandlung*, by DR. BAUMGARTEN (Vienna, 1886). This is an elaborate treatise upon the pathology and treatment of epistaxis. The account of the anatomy of the nasal mucous membrane is very full. The etiology of epistaxis is fully dealt with, as is also the question of treatment. In the latter direction it cannot be said that any very new matter is introduced.

*Dell' Artrectomia Pargiale e Totale*, by D. E. PAOLI (Turin, 1887). A full account is provided of the operation of arthrectomy. Details are given with regard to each individual point. The more practical part of the work is founded upon an account of 20 cases. Among this number were 14 cases of strumous joint disease. 13 of these ended in cure, with useful limbs, and 1 died of general tuberculosis. The author regards total synovial arthrectomy as an excellent means of promoting fibrous ankylosis. He applied it with success in a case of chronic synovitis with loose bodies in the joint and undue mobility of the limb.

*Transactions of the Academy of Medicine in Ireland*, Vol. IV. (Dublin, 1887). In addition to certain surgical papers that have been already noticed, the present volume contains the following contributions: "The Advantages of the Principle of Dry Dressings in Antiseptic Surgery," by DR. BANKS; "The Surgery of the Suakim Expedition," by DR. TOBIN; "Electrolysis in the Treatment of Urethral Stricture," by MR. HAYES.



*Die una speciale medicazione abortiva dell' erisipela*, by DR. ARNICI (Rome, 1886). In this small but ambitious work the author claims to have discovered the abortive treatment of erysipelas. He makes use of an alcoholic solution (apparently 1 in 1) of carbolic acid. This is painted freely over the skin on and about the margin of the spreading erythema. The solution is applied, not only to the reddening edge, but also to the sound skin for a few centimetres beyond that edge. Two or three applications are made within a few hours. No local trouble is said to follow. The pain that arises is checked by the use of cold. He thinks the paint acts partly as a caustic, partly as an antiseptic. He has treated 12 cases of erysipelas by this means, and 2 examples of lymphangitis. In all an immediate and rapid cure followed.

*Die Pathologie und Therapie der Gelenkentzündungen*, by PROF. MAX SCHÜLLER (Vienna, 1887). A short, but excellent and complete account of inflammatory affections of the joints. Prof. Schüller's valuable work upon scrofulous joint disease is well known. This monograph embraces the whole subject. It is well written, well arranged, and full of original matter. It is up to date, and concludes with an exhaustive bibliography.

*St. Thomas's Hospital Reports*, vol. xv. (London, 1887). The following are the chief surgical papers: "Three Cases of Nerve Suture," by SIR WILLIAM MACCORMAC. In one case the ulnar nerve was united by suture six years after division. Restoration of nerve function followed. "Pre-prostatic Puncture of the Urethra," by MR. MAKINS, a valuable paper, giving an analysis of 46 cases. "Neurectomy of the Second Division of the Fifth Nerve," by MR. CLUTTON. The operation was performed for intractable neuralgia. "Nerve-stretching of the Inferior Dental Nerve for Neuralgia," by MR. BERNARD PITTS.

*Westminster Hospital Reports*, vol. ii. (London, 1887). The two surgical papers in this volume are the following: (1) "Solid Abdominal Tumors," by MR. COWELL—an account of three interesting cases. Two were ovarian fibromata, and the third a fibroma of the round ligament. (2) "Rheumatic Osteitis," by MR. MACNAMARA. An elaborate and valuable paper, with two illustrative cases.

*Diseases of Bones and Joints*, by MR. MACNAMARA (third edition, London, 1887). In the present edition many chapters have been rewritten, much new matter and many excellent illustrations have been added, and the book is brought well up to date.

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#### BACTERIA AND TUBERCULAR ABSCESS.

DR. FARRÉ (*Deutsche med. Wochenschrift*, 1880, No. 84) has published an important paper on this subject. He has examined 30 cases of cold or tubercular abscess. In only a very few instances were bacilli found in the pus. In the cases in which no bacilli were detected cultivation experiments led to nothing. Small quantities of the pus that was free from bacilli were injected into animals with the usual precautions. In every case tuberculosis followed. Here, then, is an example of tuberculosis produced by inoculation with a

material that contained no tubercle bacilli, and yielded none of the cultivation. The paper is largely occupied by the author's theories to meet this fact. Incidentally the following data are given for the separation microscopically of tubercular pus from simple inflammatory pus. In the latter the cells are long and well preserved; there is little or no débris, pyogenic cocci are present. In the former the cells are ill formed, many are wasted. There is much fatty débris, and no cocci.

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#### THE USE OF IODOL.

DR. F. J. PICK (*Vierteljahrsschrift für Dermatologie und Syphilis*, 1886, p. 583) has used iodol in 93 cases with the following results. It is excellent in the treatment of catarrhal affections of the genitals, especially in women. It is also of considerable use in moist condylomata, but is of less value in the treatment of venereal ulcers. It has proved of but moderate value in the dressing of gummatous ulcers and buboes.

The drug has been given internally, but without any benefit. The author points out that when iodol is given internally the iodine reaction is obtained in the urine. No such reaction is observed after local application of the drug.

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#### A NEW MICROCOCCUS.

PROFESSOR MANFREDI (*Fortschritte der Medizin*, Bd. iv. p. 713) claims to have added another coccus to the already bewildering list of microörganisms.

The author founds his discovery upon two fatal cases of croupous pneumonia. In the sputa in these cases he found, in addition to the usual pneumonic bacillus, another specific bacillus of extraordinary properties. It was of oval shape, and was easily cultivated upon gelatine. The cultivation area was at first a delicate blue, and then a pearl gray, with sinuous margins. The inoculation of dogs and rabbits led to a fatal issue in seven to twelve days. Before death there occurred an enormous swelling of the spleen, and great hypertrophy of the lymphatic glands. The tumors were composed of granulation-like tissue, and rapidly caseated. The lungs were the seat of pneumonia, and also of like granular masses.

The author terms the bacillus "The micrococcus of the progressive lymphoma," and considers it the cause of the neoplasms that developed in the animals' bodies.

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#### THE INCUBATION STAGE OF HYDROPHOBIA.

DR. BAUER (*Centralblatt für Chirurgie*, January 1, 1887) deals with 537 examples of this disease in man, in which the period of incubation is stated. 10 cases are rejected as doubtful, and 17 in which it is asserted that the incubation stage extended beyond 15 months. In the remaining 510 cases the average incubation period is 72 days. So far as can be shown, the primary treatment of the wound has no effect upon the duration of this period. The following factors in influencing the length of the period between the time of the bite and the appearance of symptoms are evident.

*Sex.* In males the average period is 80 days; in females, 65 days.

*Age* has considerable influence, the stage being shortened by 20 days in patients under 14 years of age.

*The Infecting Animal.*

Bite from wolf,	49 cases,	average incubation stage,	39 days.
" " dog,	293 " "	" "	73 "
" " fox,	2 " "	" "	33 "
" " cat,	31 " "	" "	80 "
" " cow,	1 case,	" "	30 "

## THE TREATMENT OF ERYSIPELAS.

DR. NUSSBAUM (*Allg. Wiener med. Zeitung*, 1887, No. 1) advises ichthyol for the treatment of erysipelas migrans. It is applied in the form of an ointment, composed of ichthyol and vaseline, in equal parts. This is applied over the spreading margin. The part is then covered with a 10 per cent. salicylate wadding. The measure has been tried in 5 cases, with uniformly good results.

## CANCER OF THE BREAST.

MR. H. T. BUTLIN (*British Medical Journal*, 1887, vol. i. p. 436) gives the result of the investigation made upon this subject by the Collective Investigation Committee of the British Medical Association. The returns number 210.

1. *The influence of mastitis in the production of cancer.* Out of 174 instances previous inflammation or abscess of the affected breast had been noted in 27 cases. No such disturbance had been noted in the remaining 147 cases. From the returns it may be gathered that a previous mastitis plays a quite unimportant part in the etiology of cancer. In nearly one-half of the cases 20 years had elapsed between the inflammation and the appearance of the tumor. The form of inflammation that would seem to predispose to cancer is one that is continuous, or liable to frequent recurrence, or the seat of a chronic irritation.

2. *The influence of inheritance.* Out of 184 cases, in 116 there was no family history of cancer; in 68 there was. The manner of distribution in the 68 cases was as follows: 44 patients had only one cancerous relative, 19 had 2, 3 had 3, and 2 had 4 cancerous relatives apiece.

Thus the 68 patients had among them no less than 99 cancerous relatives.

In only 30 instances were the parents, grandparents, or great-grandparents of the patient cancerous.

There is thus a history of cancer in the direct line of descent in no less than 20.6 per cent. of the cases.

3. *The influence of diet.* Out of 194 returns 123 patients are stated to be moderate feeders, 57 small feeders, and 12 large feeders. The tables do not support the statement that cancer is more common in large eaters of meat.

4. *The influence of locality.* The returns under this heading, as well as under the previous one, are scant and unsatisfactory. Town, as compared with country, and high elevation, as compared with low, would appear to have no influence in the etiology of cancer.

The returns agree, to a great extent, with the conclusions of Mr. Haviland, who finds the lowest rates of mortality from cancer in those parts of England and Wales which are composed of the hardest and most elevated rocks, or



the most absorbent (like the oölite and chalk); and the highest rates in the sheltered and low-lying grounds which are composed of crag, alluvium, and clay.

#### EXCISION OF THE KNEE.

MR. MORRANT BAKER (*British Medical Journal*, 1887, vol. i. p. 321) points out the difficulty of maintaining the bones in position after the operation, and proposes the following procedure, which he has carried out with success:

After the bone-ends have been resected the tibia and femur are fixed together by means of two strong steel pins. These are made to transfix the tibia and bury themselves in the femur. They are so introduced that they cross one another, St. Andrew's cross fashion. The tibial end of the pin is left projecting beyond the skin. The pins are removed as soon as they become loose. This may occur at the end of a few days, or not for a period of from four to seven weeks. The paper concludes with 14 illustrated cases.

MR. HOWARD MARSH (*Ibid.*, p. 389) favorably considers Mr. Baker's operation. Mr. Marsh recommends the splint described in Gant's *Practice of Surgery*, 2d edition, vol i. p. 16, and employs bone pins instead of those made of steel. Ordinary bone knitting needles are used. The holes in the tibia are bored by means of a bradawl, the ends of the knitting needle are sharpened, and when they have transfixed the tibia are driven into the femur by a few taps from a mallet. The pins are cut short, and are left permanently *in situ*. Mr. Marsh has used these bone pins combined with Mr. Gant's splint in nine cases.

#### INTERNAL DERANGEMENTS OF THE KNEE-JOINT.

PROFESSOR ANNANDALE (*British Medical Journal*, 1887, vol. i. p. 319) includes the following conditions under this term (excluding "loose cartilages"): 1. Displacements of the semilunar cartilage. 2. Growths in the interior of the joint. 3. Growths from the bone protruding into the joint.

1. One or other of the semilunar cartilages (most frequently the internal one) is liable to be displaced and to interfere with the joint movements. The displacement is, as a rule, slight. The anterior attachments of the cartilage are those which are most frequently separated. The displacement may take place suddenly, due to a twist or wrench, or may occur gradually from the excessive use of certain movements, especially kneeling. Displacement of the inner cartilage is usually produced when the leg is rotated outward, and of the outer cartilage when it is rotated inward. The operation the author adopts in this condition is the following: An incision is made over the cartilage in a horizontal direction, extending backward from the edge of the patellar ligament about three inches. The joint is opened. The cartilage is replaced and fixed in position by catgut sutures that take hold of the periosteum and fascia about the upper end of the tibia.

2. Three examples are given—two of lipomata and one of myeloid sarcoma. In the former a fatty growth from the synovial membrane over one of the semilunar cartilages was present. It was removed and perfect recovery followed. The sarcomatous growth was the size of a horse bean, and grew from the synovial membrane. It was successfully removed. In these three cases

symptoms were present that closely resembled those due to displaced semi-lunar cartilage.

3. In this case—a solitary example—a bony growth, due to chronic rheumatic arthritis, grew from the lower end of the femur. It caused much impairment of the movements of the joint. It was removed and a successful result followed.

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#### AMPUTATION IN DIABETIC GANGRENE.

PROFESSOR KÖNIG (*Centralblatt für Chirurgie*, No. 13, 1887) has contributed an interesting paper on this subject. He points out that diabetic patients are liable to a low form of inflammation; that their tissues present a favorable nidus for the development of microorganisms, and show a ready disposition to necrose. He suggests that in all cases of apparently spontaneous gangrene, or of gangrene from trifling causes, the urine should be examined for sugar.

In inflammatory affections, in necrosis, and in gangrene occurring in diabetic subjects, the first and most persistent treatment should be by the use of antidiabetic measures. Amputation should not be entertained until the diabetic symptoms are retrograde. If in spite of treatment and careful local antiseptic measures, the local and general symptoms do not improve, then operation must be undertaken as a possible means of saving the patient's life.

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#### REDUCTION OF SHOULDER DISLOCATIONS.

DR. MACLEOD (*British Medical Journal*, 1887, vol. i. p. 507) claims for the method of reduction he describes the following advantages. It is easy, rapid, painless, needs no anæsthetic, apparatus, or assistants, and probably does no injury to the joint.

The method may be described as lateral extension in the supine position.

Place the patient on his back on the floor with the arm at right angles to the body, and tell him to lie still and make no effort. The surgeon, sitting on the floor at right angles to the patient's body, places his heel in the axilla, quietly takes the limb by the wrist and upper arm, and pulls in a line at right angles to the line of the trunk, at first gently and then gradually increasing up to a force of a few pounds—the arm being still on the floor, or but slightly raised from it. As reduction may take place without any intimation, to ascertain if this has occurred the hand may be placed on the joint, or the limb adducted. If necessary, repeat the traction with a greater degree of force, and should all the force that can be applied short of giving pain, fail, gentle rotation of the limb, first in one direction and then in the other, can also be made with traction. The supine position is the only one in which the muscles are completely relaxed. The abducted position removes all strain from the deltoid, and the limb is placed in the same posture, probably, that it occupied at the time of the accident.

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#### SUBLUXATION OF THE LOWER JAW TREATED BY OPERATION.

PROFESSOR ANNANDALE (*Lancet*, 1887, vol. i. p. 411) points out that this condition is due to displacement of the interarticular cartilage. Such displacement is most common in delicate women, and is due either to inflammatory changes of a simple, gouty, or rheumatic nature, or to a sudden tearing or gradual stretching of the connections of the cartilage.

The author proposes to relieve the condition by an operation similar to that which he has described for the relief of displaced semilunar cartilage of the knee-joint. An incision slightly curved, about three-quarters of an inch in length, is made over the posterior margin of the external lateral ligament of the joint, and is carried down to the capsule. Any small bleeding vessels having been secured, the capsule is divided and the interarticular cartilage is seized, drawn into position, and secured to the periosteum and other tissues at the outer margin of the articulation by a catgut suture. Two illustrated cases are given in women aged respectively thirty-eight and eighteen. In both the condition was perfectly relieved.

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#### THE SURGICAL TREATMENT OF PULMONARY CAVITIES.

MR. RICKMAN GODLEE (*Lancet*, March 5, 1887, *et seq*) has published two important lectures on this subject. The paper opens with an account of the history of this branch of surgery. Mr. Godlee traces the surgical treatment of pulmonary cavities back to the time of Sir Edward Barry, in 1726.

The following are the conditions in which surgical interference may be or has been attempted: 1. Tubercular cavities. 2. Cavities resulting from gangrene of the lung. 3. Cavities resulting from the bursting into the lung of abscesses or other collections of irritating matter from without. 4. Bronchiectasis, from whatever cause arising, and including those which depend upon the presence of a foreign body in the air passages.

Gangrenous cavities resulting from some form of pneumonia are the most promising to deal with.

The author lays stress upon the difficulty of dealing with a non-adherent pleura. "The right method of procedure in such a case, though I confess it is not a very easy one, is carefully to stitch the lung up to the opening which has been made in the chest walls."

The first lecture concludes with a series of illustrative cases from various sources and from the author's own practice.

The second lecture gives a most valuable account of the anatomy of the bronchi, illustrated by excellent diagrams. The author follows in the main Abby's account of the parts. The position of the principal bronchi with reference to the thoracic wall is given in detail.

The practical outcome of the anatomical facts is expressed as follows: 1. Foreign bodies of any considerable size will probably lodge somewhere in the main right bronchus at a distance not greater than three inches from the middle line. 2. As regards bronchiectases the smaller peripheral bronchi often serve as the starting-points for excavations of considerable size. 3. Arteries follow with great regularity the posterior surface of the bronchi. They are of considerable size, and would almost certainly be divided in any attempt to open a main bronchus from behind.

With regard to the treatment of bronchiectases, the author writes: "Our main objects in attempting to open a bronchiectatic cavity are: (1) That the secretion from it may be prevented from continuing the mischief in its passage over the bronchi, or as it is drawn down into other parts of the lungs; (2) that the cough may be diminished, it being held that the expiratory efforts have something to do with the production of the dilatation; and (3) because it is



well known that, though patients with this disorder may go on for a number of years without succumbing to it, a very large number become comparatively soon affected with some form or other of blood poisoning. With these objects in view, I should feel disposed to recommend an operation if the physician were to express a strong opinion that the cavity was a single one, or at least that the mischief was principally caused by one main cavity, and also in those cases where it has arisen from the irritating presence of a foreign body in one of the bronchi. In the latter case it would be done in the hope of removing the foreign body; in the former, in the fear that, notwithstanding the diagnosis of a single cavity, there would be found others in the same lung, and not improbably in the other lung, which, it may be, was supposed to be sound."

Illustrative cases of the surgical treatment of bronchiectases are given.

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#### CONTUSION-PNEUMONIA.

DR. A. KOCH (*Dissertation-Munich und Centralblatt für Chirurgie*, No. 10, 1887) gives what little is to be given of the history of this disease, and adds the following case: A man, aged thirty-eight, fell from a great height and received a severe contusion of the left thorax. He however continued with his work after the accident and also on the second day. Toward the end of the second day he began to feel ill and experienced a severe pain in the chest. He went to the hospital, where he died three hours after admission. The post-mortem showed croupous pneumonia with red hepatization. The lung swarmed with the bacilli of pneumonia. The ribs were not injured. The patient was entirely free from disease at the time of the accident.

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#### THE SURGICAL TREATMENT OF EMPYEMA.

DR. KASANLI (*Vratch*, 1866, Nos. 13 to 18) deals with this subject in a very exhaustive manner. The paper commences with an account of the history of the operation. 21 cases of empyema are dealt with. The subjects were young soldiers under care in a military hospital. Of the 21 patients, 10 died; 5 of tuberculosis, 1 of tetanus, 1 of pericarditis, 1 of pyæmia, and 2 of exhaustion. Of those who recovered, 8 are reported as being perfectly cured and 3 as recovering with a persisting sinus. The operation was the same in all cases, and was as follows. A rib is not removed. The fluid—especially when of large amount—is removed very gradually day by day through an aspirator. When the thorax is nearly empty an incision is made under anti-septic precautions, and a drain introduced which is carried into a vessel containing a solution of corrosive sublimate. A clamp is applied to the tube so as to allow of the slow discharge of the pus. In twenty-four hours the wound is enlarged still more, free drainage with a large open tube carried out for the first time. The tube is removed on an average on the thirty-fourth day. Recovery may be expected by the forty-fourth day.

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#### THE SURGICAL TREATMENT OF AFFECTIONS OF THE PLEURA AND LUNGS.

DR. ROCHELT (*Wiener med. Presse*, 1886, No. 32) comes to these conclusions: In acute pleuritic effusions the fluid should be removed at once by

aspiration. In cases of chronic effusion the fluid should be withdrawn gradually by repeated tapplings.

Empyema should be treated by free incisions. He gives an account of two cases of pneumothorax in phthisis treated by operation. One recovered, one died. An excellent case of bronchiectasis is reported that was cured by pneumotomy. The patient was fifty-four and the subject of chronic bronchitis. Portions of ribs were removed and the lung cavity opened and drained. Two cases of lung abscess were treated by incision. Both died; while one case of gangrene, treated by the same measure, ended in recovery.

DR. RIBBING (*Lira*, 1886, No. 16, Sweden) deals with sixteen cases of empyema, all treated by operation. Strict antiseptics was employed and free drainage. In no case did death result. In children the author considers that simple incision is sufficient. In adults, when relapse occurred, portions of ribs were resected. Washing out of the cavity is not ordered unless the pus be putrid. In all cases the evacuation of the matter should be slow.

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#### THE DIAGNOSIS OF STRICTURE OF THE ŒSOPHAGUS.

PROFESSOR OGSTON (*Medical Chronicle*, January, 1887, p. 278) points out the difficulties in the diagnosis. There may be dysphagia—depending upon dyspepsia, bronchitis, or post-diphtheritic paralysis—and yet no stricture. Stricture at the lower end of the gullet is most common in patients past middle life, and is due to cancer. In such cases the author lays stress upon the painful distention of the gullet after swallowing, felt in the centre of the thorax and the accompanying breathlessness and sense of distress.

Strictures in the upper part of the œsophagus usually occur in younger subjects, and depend upon cicatrix, diphtheria, or syphilis. In such cases the pharyngeal distention on swallowing can be made out on the left side of the neck.

In making a diagnosis Professor Ogston lays great stress upon the time occupied by the act of swallowing. In healthy subjects the passage of the food along the gullet occupies from two and a half to eight seconds. In cases of stricture it occupies from fourteen to eighteen seconds.

The starting of the bolus is indicated by the movement of the pomum Adami. "If the ear be placed behind the left thorax, three inches below the angle of the scapula, the moment of entrance into the stomach can nearly always be told by a distinct amphoric gurgle or amphoric rushing sound. By noting these two points the time involved in the act of swallowing is indicated."

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#### LIPOMA OF THE MESENTERY.

M. TERILLON (*Bull. et Mém. de la Soc. de Chir.*, t. xii. p. 23) reports the case of a man aged thirty-five, upon whom laparotomy was performed for the removal of a large lipoma. The mass had grown between the layers of the mesentery, and weighed fifty-seven pounds. The patient died of enteritis (followed by peritonitis) on the thirty-second day after the operation.

M. Terillon gives details of 14 other cases of lipoma of the mesentery. 7 were discovered on post-mortem examination, and 7 were removed by operation. Of the latter, only 2 recovered. Death was in each case due to either shock or peritonitis. Mesenteric lipomata occur in adults, and always grow

between the layers of the mesentery. The intestines lie in front of them, or to one side. Ascites is rare, and adhesions are occasionally met with. A correct diagnosis is not usually made, the affection being mistaken for cystic tumors in most instances. Pathologically, the growths belong to the myxolipomata.

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#### THE ETIOLOGY OF PERITONITIS.

DR. GRAWITZ (*Charité Annalen*, XI. Jahrgang, p. 779) has published a very valuable paper upon this subject. It is founded upon an extensive series of experiments made upon the lower animals.

Into the elaborate details of the research it is impossible to enter. The more important conclusions are these: *Schizomycetes* or *Staphylococcus aureus* injected into the peritoneal cavity will not of themselves produce peritonitis if the injecting medium be non-irritating. In the production of suppurative peritonitis two conditions are necessary in the majority of cases: 1. The introduction of pus-producing microorganisms; and, 2. The existence of some local disturbance. The latter condition is afforded when the intestinal tube is gorged with much stagnant matter and when the serous membrane has been denuded of its epithelial covering.

The subject of peritonitis from cold is discussed, and Dr. Grawitz concludes that cold alone cannot become a cause of peritonitis, nor does he consider it an important local factor when the other possible causes of peritonitis are present.

The paper concludes with a consideration of the peritonitis that often attends stenosis of the bowel and strangulated hernia. In both circumstances local damage to the serous membrane plays a very conspicuous part.

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#### THE TREATMENT OF HEMORRHOIDS BY EXCISION.

MR. WHITEHEAD (*British Medical Journal*, vol. i. p. 449, 1887) gives an account of no less than 300 consecutive cases treated by means of the operation that now goes by his name.

The treatment by ligature is very unsatisfactory and a relapse is quite common. The treatment by the clamp and cautery is still more unsatisfactory. Its immediate risks are greater and its failures by recurrence more numerous.

The present operation has been performed upon over 300 patients without a death, a single instance of secondary hemorrhage, or one case where any complication such as ulceration, abscess, stricture, or incontinence of feces, has occurred.

The following are the details of the operation: The patient is anesthetized and placed in the lithotomy position. The sphincters are well paralyzed by stretching. By the use of screws and dissecting forceps the mucous membrane is divided at its junction with the skin round the entire circumference of the bowel, every irregularity of the skin being carefully followed. The external and the commencement of the internal sphincters are then exposed by a rapid dissection, and the mucous membrane and attached hemorrhoids, thus separated from the submucous bed on which they rested, are pulled bodily down, any undivided points of resistance being snipped across and the piles brought below the margin of the skin. The mucous membrane above the piles is now



divided transversely in successive stages, and the free margin of the severed membrane alone is attached, as soon as divided, to the free edge of the skin below by sutures. Bleeding vessels are secured by twisting. A complete ring of pile-bearing mucous membrane is thus removed. No skilled assistance is required. The wound is dressed with iodoform. The sutures are of carbonized silk and are not removed. Castor-oil is given on the morning of the fourth day. The patient can resume work within a fortnight. The amount of pain after the operation is trifling, and retention of urine is uncommon.

#### HERNIA OF THE CÆCUM.

MR. FREDERICK TREVES (*British Medical Journal*, 1887, vol. i. p. 382) commences a monograph upon this subject by an account of the history of the hernia as displayed in surgical literature. In one of the earlier recorded cases (1732) the cæcum was exposed and entirely excised, the patient making a good recovery. Mr. Treves draws attention to the fact that the text-books describe the cæcal hernia as being without a sac. An account is given of the various reported cases upon which this statement is founded, and it is shown that in the more conspicuous instances the evidence is unsatisfactory.

Two cases are given. The first was met with in a man aged forty-one. The rupture was inguinal, the sac was double, and of enormous size. The sac was cut away, the cæcum exposed and reduced. A complete cure resulted.

The second case was in a woman aged fifty-six, and occupied the femoral region. The appendix could be distinctly felt. The hernia was reducible.

The author proceeds to examine 15 recent cases (8 from recent records, 9 from metropolitan museums). It appears that the hernia is much more common in the inguinal than the femoral region, and is more common in males than in females. There is, in nearly every instance, a perfect sac. In a few examples it was incomplete; in no case was it absent. The caput coli may be protruded alone, or in the hernia coils of ileum and omentum may be found. The rupture tends soon to become irreducible.

MR. G. A. WRIGHT (*Ibid.*, p. 507) gives an account of seven cases of cæcal hernia in children. The patients were between the ages of three months and seven years. They were all males, and the rupture in each instance inguinal. In all the cases operated upon there was a perfect and well-defined sac. The sac may be funicular, or be formed from the open tunica vaginalis.

The paper serves to modify Mr. Treves's statement that "the hernia of the cæcum is practically limited to adults."

#### PAROTITIS IN ASSOCIATION WITH ABDOMINAL DISEASE.

MR. STEPHEN PAGET (*British Medical Journal*, March 19, 1887) has, with great diligence, collected no less than 101 cases of parotitis consequent upon injury or disease of the abdomen or pelvis; of this number, 10 were due to injury or disease of the urinary tract; 18 were due to injury or disease of the alimentary canal, and 23 were due to injury or disease of the abdominal, the peritoneum, or the pelvic cellular tissue. The remaining 50 were due to injury or disease, or temporary derangement of the generative organs. Under the latter term are included slight blows on the testis, the introduction of a pessary, menstruation, and pregnancy.

This form of parotitis appears to be non-pyæmic, to have no definite incubation stage, and to end very often in suppuration. Mr. Paget considers that the sequence of disease is due to influences acting through the nervous system.

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#### THE TREATMENT OF ECTOPION VESICÆ.

DR. ZESAS (*Centralblatt für Chirurgie*, No. 8, 1887) advocates Sonnenburg's operation, which consists in removing the defective bladder and turning the ureters into the penis. The object of the present paper is to describe a special receptacle devised by the author, to be worn after Sonnenburg's operation. It consists of two parts—a rounded concave shield to cover the abdominal wound, and a scrotal funnel, which receives the scrotal tissues and the rudimentary penis, and leads into a tube emptying itself into an ordinary urinal. The shield and funnel are made of silver, and the points of contact are covered with an India-rubber tube, as on the edge of an ether inhaler. A case is described where the appliance was used. The patient was always kept perfectly dry. Excellent illustrations accompany the paper.

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#### SUPRAPUBIC LITHOTOMY.

SIR WILLIAM MACCORMAC (*British Medical Journal*, 1887, vol. i. p. 551) contributes another valuable paper upon this subject. The article commences with an account of the history of the operation. The modern method is described as follows: Strict antiseptic precautions are adopted throughout. The rectum is distended by an India-rubber bag, of elongated sausage-form. 10 to 12 ounces are injected. The bladder is emptied, is washed out, and then moderately distended with boric solution (6, 8, or 10 ounces). The bladder will then be readily felt above the pubes. The incision is median, is close to the pubes, and from 2 to 4 inches in length. The tissues are divided layer by layer, until the bladder is distinctly exposed. After the viscus has been secured by two loops of thread passed through the muscular coat at the upper exposed part, the cavity is opened. The stone is then removed. In young persons with healthy urine the wound in the bladder may be closed by sutures, in other cases the wound may be left open with or without drainage.

The author gives an account of a series of experiments performed to ascertain the effect of distention of the bladder and rectum upon the position of the peritoneal reflection. When the bladder alone is distended, the peritoneal reflection is somewhat but not sufficiently raised, the bladder being chiefly distended backward. Distention of the rectum alone appears to produce no palpable effect on the vesical fold; and to obtain the maximum result, distention of both bladder and rectum seems necessary. The dilatation of the rectal bag pushes the moderately distended bladder forward and upward against the parietes.

The following indications for the operation are given: A large stone in a contracted bladder, a stone projecting into the urethra, encapsulated or very hard calculi, cases of numerous stones, certain foreign bodies, ricketty deformity of the pelvis, and ankylosis of the hip-joint. Some add hypertrophy of the prostate, stricture, and irritable bladder.

The mortality after the suprapubic method is from 22 to 30 per cent. The

commoner causes of death are (in order) peritonitis, pericystitis, pyelonephritis, collapse.

In 26 cases of suture of the bladder wound primary union was obtained in 10 cases only.

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#### LITHOTOMY.

DR. ROSENTHAL (*Vratch*, 1886, Nos. 25-32) gives the following valuable statistical account. He deals with 400 cases of lateral lithotomy. 47 per cent. of the cases concerned patients under seven years of age, and 66 per cent. patients between seven and thirteen years. Out of the 400 only 40 died, a mortality of 10 per cent. In 6 of the fatal cases, death was not directly due to the operation, and the omission of these raises the mortality to 8.5 per cent. The mortality increased steadily according to age, being 3.5 per cent. in patients under five years, and 36.8 per cent. in patients between the ages of thirty and sixty-six.

The mortality in 7628 recorded cases of lateral lithotomy collected by the author is 12.08 per cent. The mortality of the suprapubic operation, on the other hand, stands at 22.1 per cent.

Out of the 40 cases of death, 17 died of pyonephritis. The rectum was wounded 6 times in the 400 operations.

The time occupied in healing averaged 18.6 days in patients under ten years, and 27.2 days in patients above that age.

The character of the calculus was determined as follows: urates, 70 per cent.; oxalates, 11 per cent.; mixed (phosphates predominating), 19 per cent.

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#### PRIMARY SARCOMA OF THE BLADDER.

DR. CHIARI (*Prager med. Wochenschrift*, 1886, No. 50) reports a case of this very rare affection. He states that only seven cases have so far been reported. The patient was a boy aged five; the first symptoms were those of retention, followed by the manifestations of chronic cystitis. No blood appeared in the urine until a catheter was used. The tumor could be felt through the abdominal parietes. The tumor sprang from the submucosa about the trigone. The prostate and seminal vesicles were invaded. A solitary gland was found enlarged. There were no other metastases. The growth proved to be a pure spindle-celled sarcoma.

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#### THE FUNCTION OF THE PROSTATE.

DR. FÜRBRINGER (*Berliner klin. Wochenschrift*, 1886, No. 29) states that the prostatic fluid is thin and acid, is rich in albumen, contains lecithin but no fat. The author believes that the fluid has other functions than that of a mere lubricating medium. He states that it acts as a vitalizer of the seminal fluid, and is of essential importance in the act of generation. In semen unmixed with the prostatic secretion the spermatozoa are found to be stiff and still; on the addition, however, of that fluid, they become at once subtle and active. The addition of an excess of prostatic secretion causes the seminal particles to become once more indolent.

These statements are founded upon observations made on animals, and on certain pathological experiments carried out upon the human subject.



## RENAL SURGERY.

T. F. CHAVASSE (*Lancet*, 1887, p. 403) gives an account of three cases that proved fatal after operation. In his comments upon these cases the author deduced the following conclusions: To obtain the greatest possible benefit from operative measures renal calculi must be sought for and removed before destruction and consequent abscess have resulted. The signs and symptoms most to be relied upon for the diagnosis of renal calculus, where no tumor exists, the patient being otherwise healthy, are the following: 1. The presence of blood in the urine, especially after erection. 2. Unilateral pain passing down the ureter toward the testis. 3. Pain on deep pressure in loin between the last rib and the iliac rest and just external to the erector spinæ muscle. 4. The presence of uric acid and oxalate crystals in the urine. In suppurative lesions of the kidney nephrotomy and drainage should be the first measure in treatment.

In one case the author passed an exploring needle twelve times into the substance of the kidney, but failed to reveal a calculus and a fair sized abscess that were ultimately discovered post-mortem.

Speaking generally, there is no doubt that the lumbar incision is safer than the abdominal. The author advises nephrectomy under these conditions: After nephrotomy and drainage have failed in cases of suppurative lesions depending upon a local irritant, in hydronephrosis, and in traumatic rupture of the kidney. It is justifiable also in cases of painful floating kidney when attempts to free the organ have failed, and in troublesome renal or ureteral fistulæ. Nephrectomy is contraindicated in tubercular disease, carcinoma in adults, and sarcoma in children.

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The following articles are worthy of note:

"Abscess of the Brain Resulting from Ear Disease," by Dr. Thomas Barr (*Brit. Med. Journ.*, April 2, 1887).

"Pianists' Cramp," by Dr. Warrington Howard (*Brit. Med. Journ.*, March 26, 1887).

"Case of Mollities Ossium in a Male," by Mr. Barwise (*Brit. Med. Journ.*, April 9, 1887).

"Laparotomy in Intestinal Obstruction," by Dr. Kümwell (*Deutsche med. Wochenschrift*, No. 12). Four cases: two of volvulus, one of mesenteric hole, one of solitary band. Laparotomy in each instance, with only one recovery.

"The Theory of Gut Strangulation," by Dr. Beeby (*Centralblatt für Chirurgie*, No. 14, 1887). An examination of Reichel's view, with a new and elaborate theory of the author's.

"Chondromyosarcoma of Kidney," by Dr. Hoiaholt (*Virchow's Archiv*, Bd. civ. p. 118). Male, aged eighteen; left kidney. Died of marasmus. Tumor composed of round-celled sarcoma mixed with muscle fibre and nodules of cartilage.

"Seven Consecutive Cases of Charbon Treated Successfully by Excision," by Thomas Bryant (*Lancet*, 1887, vol. i. pp. 367 and 416).

"Case of Trephining over the Left Branchial Centre for Paralysis of the Right Arm due to a blow a week previously. Cure," by A. W. Robson (*Lancet*, 1887, vol. i. p. 464).

"On Sounding the Frontal Sinus," by Dr. Jurasz (*Berliner klin. Wochenschrift*, No. 3, 1887). The probe is introduced from the nose. The utility of the procedure is not evident.

"Vesical Fistula after a Radical Operation for Hernia," by Dr. Feilchenfeld (*Berliner klin. Wochenschrift*, No. 3, 1887). Male, aged fifty-one; scrotal hernia. Removal of sac with ligature of neck. Urinary fistula formed at wound, which closed after many weeks. The author supposes that a vesical diverticulum must have been engaged in the ring.

"The Classification of Tumors of the Testicle," by Drs. Monod and Arthaud (*Revue de Chirurgie*, March 10, 1887).

"Malformations of the Anus," by Dr. Jeannel (*Revue de Chirurgie*, March and April, 1887).

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#### IN AMERICA.

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#### REMOVAL OF A LARGE SARCOMA, CAUSING HEMIANOPSIA, FROM THE OCCIPITAL LOBE.

DRS. W. R. BIRDSALL and ROBERT F. WEIR (*The Medical News*, April 16, 1887) make a most important contribution to brain surgery; among other points demonstrating that hemorrhage must be primarily arrested in operations involving the brain structure by reliable methods, such as the ligature, torsion, or prolonged forcipressure, and not by the tampon.

A man, æt. forty-two, in August, 1885, suddenly noticed unsteadiness of gait, succeeded by a violent attack of vomiting. Diplopia for distance soon appeared, with increasing muscular incoördination; numb sensations of the right arm, leg, and shoulder; but no disorder of sensation of the face. All these symptoms were intermittent. Occasional moderate frontal headache was experienced. No vertigo was noticed at first, and no other sensory, motor, or visceral symptoms appeared. Hemianopsia, was detected, with incipient neuro-retinitis. The diagnosis was, "tumor of mesial aspect of right occipital lobe, involving primarily the cuneus, extending downward toward the tentorium cerebelli, and perhaps also upward toward the paracentral lobule (leg centre)." Slight improvement in gait, under the use of iodide of potassium, was observed until as late as July, 1886; but in September the muscular incoördination and occasional drowsiness rapidly increased.

Examination now showed the left lateral hemianopsia still present; the neuritis well advanced, although more marked in the left eye; irides active, both to light and accommodation—the left pupil larger than the right; no diplopia, no "ocular paresis;" the special senses were normal, and there was neither anæsthesia, analgesia, disturbance of the temperature sense, paresis, nor tremor of the muscles; and the motions were "clumsy," rather than ataxic—"uncertainty of control" seemed the best term for it; and the disturbance of equilibrium increased in a most irregular manner.

On March 9, 1887, Dr. Weir operated antiseptically. An oval opening, two and three-quarters by two and one-quarter inches, was made through the bone by means of a trephine and the rongeur. The non-pulsatile dura mater was

opened for two-thirds of the extent of the bone wound, and the tumor, of a purplish-red color, presented at once, covered by a thin cellular layer containing large ramifying veins. By means of a director and spoon-handle, a thin layer of brain substance was loosened from its outer side, and by a continuance of these proceedings the growth was readily separated at the sides; but even after further free removal of bone tissue, the outlying edges and base of the growth could not be reached until it was incised and its softened interior squeezed out. After this, separation was readily effected by the finger-nail until the base was reached, when the growth was nearly torn in half, its outer portion lifted out, separated from the falx, and the whole mass withdrawn. Considerable venous oozing occurred, but was readily arrested by sponge pressure. Two bleeding points were seen: one venous, in the region of the straight sinus; and the other arterial, possibly a terminal branch of the posterior cerebral artery. Moderately firm packing with iodoform gauze to check bleeding, partial suture of the dura mater and scalp, with a careful antiseptic dressing, completed the operation. Some failure of the pulse was observed when the growth was being lifted out, probably due to loss of blood—in all, computed to be from  $f\bar{3}x$  to  $f\bar{3}xij$ —but hypodermatics of whiskey relieved this condition.

After the rapid recovery from the anæsthetic, slight divergent squint of the left eye was noted; the pulse was 132, regular, and of good volume. Enemata of milk punch were ordered every two hours. Two hours after operation the pulse was 120, weak, and there was much blood-staining of the dressings.

At 10 P. M. the patient was very restless, with an extremely weak pulse, and steady bleeding was evidently going on. Two quarts of salt solution, as modified by Landerer, were slowly injected into the median basilic vein with immediate improvement in the pulse and consciousness. Slight paralysis of the ocular branch of the seventh nerve was now detected, in addition to the already noted divergent squint on the left side. Hemorrhage being evidently the cause of the unfavorable symptoms, the dressings were removed, but such free bleeding occurred as to forbid anything more than the application of an additional iodoform gauze tampon, and a second transfusion was made; but, despite everything, death occurred at 2 A. M.

Dr. Weir regrets that forcipressure forceps, allowed to remain for from twenty-four to forty-eight hours, with elevation of head, had not been resorted to at the outset. The advisability and dangers of free bone openings are discussed, bone-grafting is advocated, either by dusting the finely minced bone over the dura mater, or by replacement of the trephine disks.

This case makes the eighth operated on for brain tumor. In five instances the growth was found and removed; in one, partial removal was effected; and in the remaining two, no tumor was found, although in one case the post-mortem, two and a half months later, revealed a growth pressing upon the cerebellum and spinal cord.

The growth weighed  $5\frac{1}{4}$  ounces, and measured  $3\frac{1}{4}$  inches by  $2\frac{3}{4}$  by  $2\frac{1}{2}$  inches thick, the greater circumference measuring  $8\frac{1}{2}$  inches.

#### PLEUROTOMY BY RESECTION OF THE RIBS FOR EMPYEMA.

DR. W. H. STRICKLER (*The Medical News*, May 7, 1887) describes the following operation: Across the sixth rib in the axillary region a vertical cut of



three inches is made with its centre over the rib. A transverse cut of one inch crosses the primary one at its centre. The sixth rib is bared, partially divided at two points by a Hey's saw, and finally severed by bone forceps. The pleura now being opened the chest is explored by the finger to ascertain the position of the diaphragm, when a section of the seventh and of the fifth ribs is removed—about one inch of these, while the exsected portion of the sixth rib measures one and a half inches; this is to secure space between the extremities of the segments of this rib, when the cut ends of the fifth and seventh ribs are driven together by atmospheric pressure. All bone sections having been completed, the pleural cavity is carefully explored, by the whole hand, except the thumb, all fibrinous masses are carefully removed, any bands likely to prevent expansion of the lung ruptured, and the cavity thoroughly irrigated with large quantities of hot water. All but the centre of the wound is sutured, and gauze and oakum applied over all. After the first week a tube is used to keep the wound patent, which is gradually reduced in size. From the outset, daily flushings with hot water are used. Five cases are reported, which have done well. The operation is a modification of one in general use.

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#### PISTOLSHOT WOUND OF THE ABDOMEN; LAPAROTOMY; NEPHRECTOMY; AUTOPSY.

DR. W. W. KEEN (*The Medical News*, May 14, 1887) gives the details of a most interesting case, which should be carefully studied by every surgeon, illustrating, as it does, many points which are both new and of practical importance in this latest field of operative surgery. The title contains nearly all the essential points, and since nothing short of an almost complete reproduction of the paper could do it justice, we shall merely add what seems to be the apparent cause of the fatal termination of a case which bade fair to recover, and one or two minor points worthy of comment. Generalized, non-suppurative peritonitis was found post-mortem, and a gangrenous portion of bowel opposite to the ball wound of the intestine, in the centre of the dead portion two perforations existing with pus in the lumen of the bowel. This was probably the cause of the peritonitis, and Dr. Keen thinks resulted from contusion of the mesentery not detectable at the operation, but causing thrombosis of the arterial supply to the portion of bowel-wall which necrosed. An extensive intermesenteric layer of blood effused before, and found at the operation, had also broken down and looked purulent, but did not communicate with the peritoneal cavity. At the post-mortem examination the right kidney was found to have undergone marked compensatory enlargement, which the clinical history indicated must have taken place, since the urine, while scanty at first, gradually increased in three days from 3ij of albuminous fluid to 3xl of normal secretion.

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#### SPLENECTOMY FOR WANDERING SPLEEN.

DR. W. H. MYERS reports (*Journal of the American Medical Association*, April 2, 1887) a successful case, the operation being demanded for the relief of septic symptoms induced by abscess, resulting apparently from the pressure of an enlarged and dislocated spleen. The suppuration was unquestionably favored by the post-partum state, the patient having been delivered about three

weeks previously, although the splenic hypertrophy had existed to a marked degree for over one year. The perisplenic abscess had opened externally before operation by three orifices. Strict antisepsis was attempted and secured. The pedicle was transfixed by a double ligature, tied in halves, and dropped into the cavity, and a glass drainage tube inserted. The tumor weighed seven pounds. Recovery was prompt, the patient going home on the twenty-first day.

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ANEURISMS TREATED BY THE INTRODUCTION OF CATGUT OR OF WIRE,  
WITH ELECTRICITY.

In this most interesting paper (*The Medical News*, April 9, 1887) DR. ROBERT ABBE reviews the histories of those cases treated by wire alone, and then relates an instance in his own practice, where the introduction of one hundred feet of aseptic No. 1 catgut into the cavity of a large dissecting aneurism of the right subclavian artery was of temporary benefit. Increase in size occurring after a few days, one hundred and fifty feet of fine sterilized steel wire were introduced through an insulated aspirator needle, the positive pole of a galvano-faradic battery was attached to the extremity of the wire, while a copper plate—12 inches by 12 inches—covered with wet cotton, placed over the back, was connected with the negative pole. A current of fifty milliampères was at first used, finally a very much stronger current, the current being reversed during the latter part of the operation, which occupied one hour. For twenty-four hours decided hardening of the tumor was noted, then it rapidly increased, death resulting on the second evening from rupture into the trachea.

The writer reviews the results of this, and similar treatment, in the practice of others, concludes that, as it has only been tried in desperate cases, we are not able to decide what value inheres to the practice, and thinks that, as it does no harm, it should be still tried—all the more, as the post-mortem results show that in many cases large quantities of firm, laminated clot have been formed, while “the subsequent much-desired inflammation of the sac was easily kept under control by ice-bags in every case.” Two cures have resulted from the introduction of wire, while electrolysis alone has occasionally succeeded. In reality, Dr. Abbe has combined both methods—*i. e.*, introducing a tangled mass of easily compressible wire reaching every portion of the sac, and then inducing deposition of clot upon it by electrolysis; in addition, inflammation of the sac, which Cinicelli contends is essential to the success of his method, is induced.

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A CASE OF INNOMINATE ANEURISM TREATED BY SIMULTANEOUS DISTAL  
LIGATION OF THE RIGHT CAROTID AND SUBCLAVIAN ARTERIES. RE-  
COVERY.

DR. H. R. WHARTON records (*The Medical News*, April 9, 1887) the history and results of treatment of a case operated upon by Professor J. Ashhurst, Jr., at the University College Hospital, on November 13, 1886. The right common carotid was ligatured with catgut above the omohyoid muscle, after which the subclavian of the same side was secured just outside the anterior scalene muscle. Silver sutures, drainage tubes, and an oiled lint dressing were used. Neither unpleasant cerebral symptoms occurred, nor did improvement in the aneurism at first take place. In a few days, however, the aneurismal tumor

became smaller, the dyspnœa and dysphagia markedly diminished, and the patient could sleep in the recumbent posture. No radial pulse was detectable even when discharged two months after operation. Examination at that time showed only the merest traces of the previous trouble, so slight, indeed as to warrant the belief that a complete cure has resulted. The recorded cases of this operation are examined and commented upon, the results of consecutive ligation compared, and the opinion expressed that the simultaneous ligation of the right carotid and subclavian arteries for innominate aneurism "is a more efficient and safer procedure than consecutive ligation of these vessels."

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THREE CASES OF LIGATURE OF THE EXTERNAL CAROTID ARTERY, IN TWO OF WHICH BOTH VESSELS WERE TIED SIMULTANEOUSLY.

DR. JOS. D. BRYANT (*The Medical News*, May 14, 1887), in a lengthy paper, well worthy of a careful perusal, sums up with the following conclusions: 1. Ligature of the external carotid artery, together with independent ligation of the branches arising from the first inch of its course, is a safe and commendable operation. 2. When the facial and lingual arteries do not arise singly, or by a common trunk, from the first inch of the course of the external carotid, the branches arising at the point of bifurcation of the common carotid should be tied. 3. Simultaneous ligation of both external carotids is a rational preparatory measure for operations involving the parts supplied by their branches when dangerous hemorrhage is feared. If the pharynx be involved, the ascending pharyngeal branches should be ligatured also. 4. Simultaneous ligation is advisable as a final expedient to diminish the rapidity of the development of extensive, malignant growths when they are nourished by the branches of the external carotids. 5. Ligature of one or both external carotids for the cure of aneurismal formations of the branches of the same is not feasible as an independent curative measure. 6. Ligature of the common carotid should not be done for the cure or for the arrest of morbid conditions involving the external carotid or its branches, except as a final resort.

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THE TREATMENT OF OLD DISLOCATIONS OF THE ELBOW.

DR. L. A. STIMSON reports, in *The Medical News* for April 2, 1887, a case in which arthrotomy was resorted to, and upon the reproduction of the displacement, excision of the joint was done two months after the first operation.

Attention is called to the adhesions formed by the remains of the lateral ligaments and adventitious cicatricial bands between the olecranon and humerus, which take place so far up and behind the centre of motion that reduction can only be effected by a greater degree of force than originally produced rupture of the articular ligaments. Stripping up of the periosteum on the dorsum of the humerus by the head of the radius occasionally takes place, with a consequent formation of bone greatly interfering with reduction. Removal of pressure from a growing epiphysis—*i. e.*, that of the capitellum of the humerus—may result in an overgrowth of this process in the young, while elongation of the neck of the radius may take place from the same cause, both of these conditions preventing reduction. Fractures of portions of the coronoid process, the head of the radius, or of the epitrochlea, may, by subse-



quent bony adhesions in new sites, present insuperable obstacles to replacement of the articular surfaces.

Stimson, in his arthrotomy, made a single, instead of the usual bilateral incision—which latter procedure he announces he intends adopting in the future—divided the olecranon, separated adhesions, reduced the luxation, and then sutured the divided bones with silkworm gut. Owing to the strain exercised upon the olecranon by the tense triceps muscle, the elbow had to be fixed at an angle of 145 degrees, a position which doubtless determined the redisplacement.

Dr. Stimson concludes by stating his acceptance of the rules formulated by Albert for cases of old backward luxation of the elbow, viz., rupture or tenotomize adhesions in the elderly, and if reduction then fails, forcibly flex the elbow to a right angle, with or without fracture of the olecranon, and allow ankylosis to occur. In younger subjects divide subcutaneously all bands, and even the triceps, to avoid fracture of the olecranon; but if the bones cannot then be replaced, arthrotomy should be done by two lateral incisions. Finally, if everything fail, excise the joint.

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## OPHTHALMOLOGY.

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UNDER THE CHARGE OF

L. WEBSTER FOX, M.D.,

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### OPHTHALMOPLEGIA EXTERNA ACUTA.

In the *Edinburgh Medical Journal* for March Drs. BERRY and BRAMWELL report a case of ophthalmoplegia externa acuta in a child of two and a half years, probably due to a scrofulous lesion of the pons Varolii, with subsequent recovery. The authors admit that the exact nature of the lesion must, to some extent, be a matter of conjecture, but were disposed to think that it was probably tubercular from the sudden nature of the attack and the clinical history of the case. The ocular symptoms manifested themselves as follows: Almost complete ptosis of both lids, inability to elevate the eyes, complete loss of the power of depressing them; the internal rectus of the right eye was absolutely, and that of the left almost completely, paralyzed; absolute divergence of the eyeballs, the pupils from four to five mm. in diameter, which contracted promptly to light. There were no visible changes of the fundus oculi. Dr. Berry's diagnosis was paralysis of the third and fourth nerves and paresis of the sixth—*i. e.*, almost complete ophthalmoplegia externa.

By careful examination, no loss of sensation or derangement of motion could be elicited other than could be accounted for by the general apathetic and drowsy condition of the patient. The authors localized the lesion at the top of the pons Varolii and in the neighborhood of the aqueduct of Sylvius, from the fact that the muscles supplied by the third, fourth, and sixth nerves on both sides were involved and vision unaffected. The prompt pupillary

reaction demonstrated that it was not the trunk of the third nerve but only those nuclei connected with the external muscles of the eyeball which were implicated. The fifth nerve was apparently unaffected.

The authors bring to their support the researches in the localization of the motor functions of the eye by Henson and Völckers, Kahler, Pick, and Ferrier. The labors of Henson and Völckers have established the fact of a differentiation of centres of the third pair of nerves, so that each of the ocular muscles, the levator, the superior, inferior, and internal recti, and the inferior oblique, has a distinct and localized nuclear origin beneath the floor of the aqueduct of Sylvius; moreover, the centres for the reflexes of light and accommodation (the iris and ciliary muscle are not only distinct from the preceding but from each other) are placed further forward toward the summit of the third ventricle. From these anatomical differences of origin we can understand how there may be ophthalmoplegia externa whilst the pupillary and ciliary reflexes are perfectly normal; and also how the reflex to light may be abolished with conservation of the accommodative reflex as in the "Argyll-Robertson pupil."

The differential diagnosis between ophthalmoplegia of nuclear origin and that arising from peripheral lesion depends on the following symptoms: In the first instance there is a slow, gradual, and progressive suppression of ocular motility, with a moderate degree of ptosis that may be temporarily overcome by the will, and with normal pupillary and accommodation reflexes. In paralysis of peripheral origin, the failure of function is monolateral, sudden, subject to no changes or intermissions, and if existing, the ptosis is not controllable by the will. This latter phenomenon finds its explanation in the clinical and physiological fact that the levator is the only one of the ocular muscles whose relations with the cortex have been established.

The patient recovered under the internal administration of the iodide of potassium.

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#### IMPERFECT CONVERGENCE IN EXOPHTHALMIC GOITRE.

P. J. MÖBIUS (*Centralblatt für Nervenheilkunde*) finds a subnormal converging power in patients with Basedow's disease, the remarkable fact being that the imperfection is independent of the proptosis, since in two cases when the proptosis was marked, convergence was normal, and in the other six cases, varying greatly in the degree of proptosis, the imperfect convergence was decided. The author concludes that the phenomenon is due to the nervous debility, and cites Perinaud, who found a reduced power of convergence in neurasthenic patients.

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#### SYPHILITIC ARTERITIS OF A RETINAL ARTERY.

In the *Correspondenz-blatt für Schweizer Aerzte*, HAAB reports a case believed to be unique, of pronounced arteritis of one of the branches of the retinal artery, due to syphilis. The trunk of the artery showed spots of brilliant whiteness, often resembling white scales, whilst in the smaller subdivisions of the branches the change was shown throughout. These lesions were markedly lessened by constitutional treatment directed against the general syphilitic condition.

## PHYSIOLOGICAL ACTION OF ATROPIA ON THE IRIS.

DR. H. HÖLTZKE in *Klinische Monatsblätter* for March, asserts that mydriasis of the pupil following instillations of atropia, is caused by paralysis of the nerve endings of the oculomotorius only. His statement is based upon experiments made upon lower animals, where the pupil had been dilated by atropia and the sympathetic nerve severed; the pupil immediately after the operation contracted; by the application of faradization dilatation follows. Contraction and dilatation of the pupil have been observed in a non-atropinized eye, where the same experiment has been made.

Stilling advances the argument that atropine not only paralyzes the nerve endings of the oculomotorius, but also irritates the sympathetic, and brings to his support the fact that in paralysis of the third nerve, due to some lesion, where we have a certain amount of pupillary dilatation (about five mm.), an application of atropia will dilate the pupil still further (8 mm.). He argues that the atropia irritates the sympathetic, thereby producing secondary mydriasis.

Höltzke explains this as follows: Inasmuch as the lesion is along the trunk of the nerve, there still remains a certain amount of force in the ganglion cells situated in the iris or anterior portion of the uveal tract or ciliary ganglion, which gives a certain amount of remnant tonicity to the peripheral ending of the nerve, it being these cells which the atropia affects, and thereby producing the secondary dilatation. Cocaine produces mydriasis of the pupil by its irritant effect upon the sympathetic, hence the secondary dilatation in an atropinized eye. Our author sets forth this fact in support to his primal assertion that atropia only acts physiologically upon the third nerve when applied to the eye.

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 SNOW-BLINDNESS.

DR. L. B. GRADDY, of Omaha, Neb., had under observation six patients suffering from snow-blindness. They were hunters, following their occupation in a district covered with snow. The intense glare of the sun reflecting from the snow produced the visual defect. The first manifestation of disturbed vision was their inability to outline game (wild geese) below the horizon. The visual defect increased to such a degree that landmarks which guide men on the plains, faded rapidly away, and it was with difficulty that they found their way into camp. Forty-eight hours after the attack, the victims were found by Dr. Graddy suffering intensely with photophobia, lachrymation, conjunctivitis, ciliary neuralgia and, in two cases, complicated by a narrow, horizontal band of superficial keratitis. The patients described their condition as if enveloped in a white, heavy mist. As their faces were sunburned, Dr. Graddy assumes that the pathological condition of the conjunctiva and cornea was of the same character, and the blindness due to molecular change in the retina, caused by over-stimulation.

The treatment instituted was soothing external applications and dark rooms. Recovery followed, with useful vision.

Indians and trappers have an ingenious way of protecting vision, where the glare is intense, by applying around the eyes, and over the cheeks, a gunpowder paste, or goggles made of the untanned skin of animals, fitting closely around the orbit.



## MYOPIA IN THE SCHOOLS OF STOCKHOLM.

In an examination of 1446 school children of Stockholm, PROFESSOR JOHAN NIDMARK found no myopia in children of six or seven years of age, whilst among scholars of eight and nine there was, among girls, but one case; among boys 14 per cent.; at sixteen, 33 per cent. of boys and girls were myopic, with an average of  $-2.5$  D. In the highest grades the proportion of myopes among the girls rose as high as 54.28 per cent., with an average degree of  $-3.5$  D., the frequency among boys not being so great, one school (girls) showed a frequency of 66.67 per cent., and a mean of  $-4.16$  D. The statistics show that the injury is greater to the eyes of girls, a result to be expected, both on account of the comparative weakness of females, and the nature of their work outside of school.

## SILVER BALLS AS SUBSTITUTES FOR THE VITREOUS AFTER EVISCERATION.

In the report of the Bristol General Hospital (*British Medical Journal*) two cases of the successful use of hollow silver (instead of glass) balls is detailed, for the substitution of artificial vitreous after evisceration, by MR. W. P. KEALL. The evisceration was thoroughly performed under antiseptic precautions. The ball was of a size easily enclosed by the sclerotic. The opening in the sclerotic was made just outside of the sclerocorneal margin in a horizontal and curved direction, whilst that of the conjunctiva was vertical, in order more effectually to close the hollow of the eye. The wounds were stitched with fine silk thread. The dressing was a pad of boracic lint moistened with carbolic lotion. No pain was experienced from the pressure of the balls, and in a few weeks all inflammation and discomfort had disappeared.

## GOUTY AFFECTIONS OF THE EYE.

M. ZYCHAN (*Recueil d'Ophthalmologie*) describes the ocular symptoms consequent upon gout. The sclerotic is most frequently attacked, though the lachrymal ducts, the lids, and other parts are sometimes affected; vascular congestion and swelling are usually the most noticeable objective symptoms; calcareous deposits have been found under the conjunctiva of the upper lids near the margin, producing by the friction (as in trachoma) irritation of the conjunctiva of the globe, photophobia, etc. The deposits may be extracted or picked out with any sharp instrument. If dry eczematous scales form upon the lids, with intense itching, the author recommends dusting the parts with calomel or calomel and morphine combined. The capillary degeneration of gouty subjects is shown by conjunctival hemorrhages and extravasations.

## TRANSPLANTATION OF RABBIT'S EYE INTO THE HUMAN ORBIT.

DR. CHARLES H. MAY reports the failure of an attempt of this kind in the *Archives of Ophthalmology* for March, 1887. The attempt is noticeable only because every circumstance attending the whole proceeding was as favorable to success as desired. The patient's health was all that could be wished, the operation was done with skill and care, and with every precaution, antiseptic and otherwise, that could be demanded; the subsequent events were all favor-

able to a successful result, but on the ninth day ulceration of the transplanted eye began to appear, and it was removed. The muscles and optic nerve had united more or less firmly, but the mass of foreign tissue proved too great; its nourishment was impossible under such circumstances.

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#### ARTIFICIALLY PRODUCED CATARACT.

In *La Semaine Médicale*, MESSRS. BOUCHARD and CHARRIN state that naphthalin produces cataract of both eyes in rabbits; it requires three to four weeks, daily doses of about twenty-five grains, to produce this result.

In examining the functions of the cochlea, DR. STEIN found that the persistent action of a high-pitched tuning fork produced cataract in young porpoises in from eighteen to twenty-four hours. The opacity of the lens passed off in time, but could be reinduced by the tuning fork. In animals whose ears had been destroyed, the cataracts were producible in two or three hours.

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#### A NEW CAUSE OF MYDRIASIS.

DR. RAMPOLDI (*Recueil d'Ophthalmologie*, March, 1887) calls attention to bronchial and pneumonic affections as frequent sources of unilateral (sometimes bilateral) mydriasis. He has noted the fact, especially after the patient has passed a sleepless night from cough, and explains the phenomenon as a result of irritation of the cervical sympathetic which supplies the radiating fibres of the iris.

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#### CATARACT EXTRACTION WITHOUT IRIDECTOMY.

In the *Archives of Ophthalmology* for March, 1887, DR. H. KNAPP reviews the reasons for and against a preceding iridectomy in cataract extraction. His conclusion is: "Simple extraction is an operation of the highest order, and practicable in the majority of cases with the same degree of safety as the extraction combined with iridectomy. In a considerable minority, however, the latter method is preferable; in a number of cases the indications for the iridectomy manifest before, in others only during, the operation." He concludes that an iridectomy should be made when, from fluidity of the vitreous and rupture of the suspensory ligament, or from insufficient section, the vitreous, instead of the lens, presents; when the iris has been injured, when the sphincter is unyielding, when, subsequent to the expulsion of the lens, the iris proves irreducible.

Of the twenty-nine cases detailed which served as clinical proof of the results, there were eighteen "perfect or ideal recoveries"—i. e., the pupil was central and movable, and unobstructed by inflammatory products. The advantages of the operation without iridectomy are evident; there is a normal and active pupil, a natural appearance of the eye, increased acuteness and better eccentric vision, etc. On the other hand, the operation is somewhat more difficult, the section larger, the lens less easily expelled; there is greater danger of prolapse of the iris and posterior synechie.

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#### IRRIGATION OF THE ANTERIOR CHAMBER AFTER CATARACT EXTRACTION.

In *Annales d'Oculistique* for January, 1887, DR. GRANDCLEMENT, of Lyon, reviews the method adopted, and the nature of the liquid used by MacKeown,

Wicherkiewicz, and Panas for irrigation of the anterior chamber after cataract extractions. Wicherkiewicz reduced the practice to a method for operations upon immature cataracts, instead of artificial maturation. Wecker made these injections, containing a solution of the salicylate of eserine, in order to secure pupillary contraction and to prevent prolapse of iris; Panas requiring not only cleansing, but also antiseptic properties.

Inasmuch as the usual antiseptics, such as the bichloride of mercury or phenic acid, were too irritating, he employed the biniodide of mercury (0.05 gramme to 1000 grammes, with 20 grammes alcohol, at 90°), which he found successful, patients usually recovering in seven days. Grandclement performed four cataract operations, following the details as suggested by Panas, excepting the strength of the solution, which was but half strength, for fear of producing too much irritation.

In the first case the solution was used thoroughly. The vision immediately following the irrigation was excellent, but in twenty-four hours, and still more marked on the second day, the cornea was striated and lacked transparency. The iris and capsular sac became involved and the final result was not brilliant.

The three cases following responded more favorably to the treatment. Our author found the intra-capsular irrigation, as practised with Panas' solution, dangerous, and according to experiments made upon rabbits by Drs. Betremieux and Vassaux, disciples of Panas, the salts of mercury should be abandoned. For operations upon immature cataracts our author now uses boiled and sterilized water, having abandoned all antiseptic liquids as dangerous and useless, there being no microbes in the eye; besides, the recent investigations and experiments of Prof. Sattler prove that Panas' solution is absolutely too weak to kill the numerous microbes which he found in the lachrymal sac and secretions of the conjunctiva of individuals suffering from catarrhal inflammation of the lachrymal ducts. To destroy the microbes a solution four times the strength would be required—much too irritating to apply to the eye. Boracic, salicylic acid, and other substances reputed antiseptic, Sattler found useless in the destruction of micrococci.

With patients having cataracts and suffering from catarrhal inflammation of the lachrymal canal, our author suggests the application of the sublimate, 20 centigrammes to 1000 grammes, for a shorter or longer time, to the palpebral aperture until a violent conjunctivitis is produced, this is then mastered by astringent washes, and the operation for cataract, or, what is still safer, a preliminary iridectomy performed. Five or six weeks subsequently the lens may be removed through the scar-tissue, which must be less favorable to the evolution of morbid germs. Our author has followed this method with good results, not depending upon boracic acid, which seems too much in vogue to-day. The reviewer has found boroglyceride, fifty per cent. solution, a most efficient remedy in cases as described above.

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#### TRANSPLANTATION OF THE CORNEA.

In Zahender's *Klinische Monatsblätter* for February, 1887, PROF. ADIMUK reports his attempts at corneal transplantation into human eyes, emphasizing the recommendation that an adjacent portion of sclerotic be also transplanted.



This is in view of the fact that the cornea is nourished from its periphery, and that the sclerotic heals more rapidly than the cornea. It therefore became necessary to choose some animal having an eye small enough to enable the operator to procure a piece (by trephining) of the requisite tissues and size. Three attempts were made with rats' eyes; the tissues proved too thin and weak to withstand the intraocular pressure of the human eye. But there was union and healing of the transplanted part, and this gave encouragement to other attempts.

Five trials were made with hen's eyes. Two ulcerated, and three grew firmly in place, but these cases subsequently passed out of observation, and no definite results can be stated. The author, however, urges that his partial success renders the method of including a bit of the sclera with the transplanted piece a prerequisite of success. The method whereby this opaque part subsequently becomes transparent by a spontaneous process is hard to believe. It is evident that the success of the endeavors must depend upon a more perfect technique. Personal disappointments and the scepticism of others have not discouraged v. Hippel, who recently successfully ingrafted a rabbit's cornea (4 mm.) in the opaque cornea of a girl seventeen years old.

The visual acuity at the end of eight days was  $\frac{20}{CC}$ . The investigations of

Leber upon the liquid changes of the eye have taught us that the transparency of corneal tissue is only protected by the intact state of Descemet's membrane, hence the transplantation is made possible, only if the endothelium of this membrane preserves its integrity. If the membrane is wounded it rolls upon itself, and failure is the result. The method, which is difficult and delicate, is applicable only to non-adherent leucomas, according to von Hippel.

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#### INFLAMMATION OF THE LACHRYMAL CANAL.

DR. MONTANELLI (*Bolletino d'Oculistica*) reports that two cases of dacryocystitis, which proved rebellious to the usual line of treatment, responded promptly to the daily irrigation of the canal of a solution of boracic acid (40 in 1000) with one gramme of salicylic acid. The injections were made with a perforated nozzle introduced in the upper lachrymal duct, and this probe attached to a rubber tube terminating in a reservoir placed 90 centimetres above the level of the eye.

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#### OCULAR INJURIES CAUSED BY THE OBSTETRIC FORCEPS.

BERGER (*Archives für Augenheilkunde*, March, 1887) reports a case of ocular injury caused by obstetrical forceps, which, from its rarity, attracts attention. The levator palpebræ was so injured that the child (of four years) suffered with marked ptosis, and an almost complete lack of power of the rectus superior. Fundus oculi was normal, the refraction hyperopic and astigmatic, vision

$\frac{20}{XXX}$ . Three other cases of ocular injuries by forceps are all that are recorded in ophthalmic literature. These are by Steinheim, in the *Deutsche medizinische Wochenschrift*, 1883, No. 17.

INCISION OF SWOLLEN OPTIC NERVE SHEATH, AND ETIOLOGY OF  
"CHOKED DISK."

MR. BRUDENELL CARTER (*Lancet*, March 26, 1887) reported to the Medical Society of London an interesting and successful instance of incision of the nerve sheath, and escape of the contained fluid, in a case of swollen optic disk. Under iodides and mercury no improvement had taken place, but the symptoms rapidly grew worse. Vision was already seriously threatened. The operation was preceded by a division of the external rectus, and the sheath of the optic nerve was exposed by rotating the eye inward, and the incision made. There was immediate relief from headache. In ten days the swelling of the optic disk had become reduced by one-half, and the recovery was uninterrupted.

The case, he thought, goes far to prove that the pathology of swollen optic disk is primarily dropsical, and only secondarily neuritic. Dr. Carter argued that there was a descent of fluid from the subarachnoid space to the space between the dural and pial sheaths of the optic nerve, and from this cause resulted compression of the nerve, and impeded venous circulation.

Readers interested in this question of the etiology of optic neuritis, will find a thorough *résumé* of Deutschman's researches and experiments in relation thereto in the *Ophthalmic Review* for April, 1887. Deutschman makes it clear that the so-called choked disk is not pathologically distinct from other forms of papillitis, and that the inflammatory process in the nerve is generally an ascending, rather than a descending one. The conclusion reached is that papillitis does not depend upon pressure, but results from an irritating fluid passing from the cranial cavity, and arrested at the bulbar end of the optic nerve, producing there an infective action. This conclusion would, therefore, as necessarily demand the surgical procedure above described, as if pressure, instead of being only a subsidiary cause, were in fact the sole cause. In cases, therefore, when loss of vision is threatened from papillitis of any kind, the indication points to immediate incision of the optic nerve sheath and drainage of the dammed-up retrobulbar infecting fluid.

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OPHTHALMIA NEONATORUM.

The fifth of DR. C. BELL TAYLOR's clinical lectures on diseases of the eye (*Lancet*, April 16, 1887) is devoted to ophthalmia neonatorum, and is a succinct account of the fearful consequences of the common neglect of obstetricians to give but an instant's attention to a simple prophylactic measure.

Of 630 cases treated *in the early stages* by Professors Horner, Schweigger, and Hirschberg, every one recovered with absolutely perfect sight, whilst of 120 cases treated by the same physicians, but *only in the later stages*, 49 became wholly blind. Of the 300,000 blind people in Europe, from one-third to one-half are so from simple neglect of an absolutely certain and well-known precaution.

Credé's method—a two per cent. solution of nitrate of silver dropped into the eyes of *all* newborn infants—should be a public law, neglect of which should debar a physician or midwife for all time. It is an old warning, but it is one that ignored daily produces such a stupendous amount of misery that it seems always *à propos* again to call attention to it.

## OTOLOGY.

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 UNDER THE CHARGE OF

CHARLES H. BURNETT, M.D.,

PROFESSOR OF OTOLOGY IN THE PHILADELPHIA POLYCLINIC AND COLLEGE FOR GRADUATES IN MEDICINE, ETC.

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 SARCOMA OF THE CONCHA.

DR. M. D. JONES, of St. Louis (*St. Louis Courier of Medicine*, Feb. 1887), reports the following interesting case of this rare affection:

A negro, aged seventeen, had a lobulated non-pedicellate tumor about the size of a chestnut, springing from the centre of the right concha, filling it and hiding the orifice of the external meatus. The mass looked glossy, and at first was mistaken for a huge polyp protruding from the meatus. The patient stated that two months previously he noticed a pimple on his ear, which itched greatly. He repeatedly scratched it and removed a scab from it, which was followed each time by moderate bleeding. Suddenly the pimple began growing, and in a few weeks attained its large size. At no time was there pain about the auricle. The growth was removed by a cold wire snare, and proved to be a small spindle-celled sarcoma. Fibro-sarcoma of the lobule is not rare and is generally met in the negro. Sarcoma of the auricle, however, is rare, and the case reported here makes the third one where the cancer was found invading the pinna primarily.

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## ON THE MANAGEMENT OF PERFORATIONS OF THE MEMBRANA TYMPANI.

SIR WM. B. DALBY believes that perforations possess individualities of their own. (*British Med. Journal*, March 12, 1887.) They display an "infinite variety," in their occasional rapid healing, in their tolerance at times of treatment, and again their intolerance and a great susceptibility to climate and diet, especially to stimulants. It is maintained that in all cases of aural discharge, in young children, the membrana is usually perforated. When examined, a few weeks after the discharge has ceased, the perforations will be found to have closed. We must, therefore, "admit that during infant-life the membrane is extremely prone to become perforated, and, happily, equally prone to heal." It is also worthy of note that the majority of these children hear well when they grow up. Although this fortunate ending is often due in part to the fact that there has been no local interference, "it does not follow that nothing should be done for recent infantile perforations of the membrane." They are better, however, without treatment "if such treatment includes mineral astringents in solution." Sulphate of zinc and acetate of lead lotions are worse than useless, as they injure the ear as an acoustic organ, because they "astringe the tympanic end of the Eustachian tube," prevent the expulsion of discharge from the tympanum through the perforation, and permit it to collect and become inspissated. They also cause cicatrization of the edges of the perforation, and interfere, therefore, with the process of repair of the hole in the membrane.

The treatment must consist in scrupulous cleanliness of the middle and external ear, the use of vegetable astringents, and the exclusion of air. This



forms the routine treatment under which recent perforations are most likely to heal. The same will apply to recent perforations in adults.

Perforations of long standing and with copious purulent discharge, improve under the use of alcohol instillations of various dilutions. In perforations of small size alcohol generally proves irritating and painful. It is claimed by our author that boric acid and iodoform, though usually acting well, sometimes, in chronic perforations, cause pain in the same side of the head. Our experience with iodoform is limited in comparison with our experience in the use of boric acid; but as both are known to have local anæsthetic properties, it is difficult to see how their use in the ear can cause pain in it, or in the corresponding side of the head. As a matter of fact, we have never seen any such results from their use in the ear, if they are simply insufflated. If they are blown in and then packed down into the fundus of the auditory canal, as is the manner of some, irritation is very apt to ensue.

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#### THERAPEUTIC EFFECT OF IODOL IN SUPPURATION OF THE EAR.

According to Schmidt, iodol possesses the advantage over iodoform in being inodorous, less irritant, and in not exciting any toxic symptoms from its employment on wounds. DR. STETLER, of Königsberg, Russia (*Archiv für Ohrenh.*, Bd. 23, pp. 264-268), has endeavored to substitute iodol for iodoform in the treatment of diseases of the ear, especially in purulent otitis. It has been applied by him by insufflation, after a careful cleansing of the auditory canal, once or twice a day, according to the abundance of the discharge from the ear. The results of his experiments show that iodol has much the same action as iodoform. In the clinic of Schwartz, at Halle, iodol has been tried also. In the same number of the *Archiv f. Ohrenheilkunde*, there is a report of the results obtained there. Iodol being but slightly soluble in water, it has been used according to the plan of Mazzoni, viz., two grammes are dissolved in a mixture of sixteen parts of alcohol and thirty-four parts of glycerine. It has been used chiefly in otorrhœa complicated by caries of the bone. Compresses of gauze, dipped in the above solution, were placed upon the diseased bone, after cleansing, once or twice daily. The results were favorable; both the odor and discharge diminished. The formation of healthy granulations was not hastened by its use. On the whole, it does not seem that iodol has much of a future in otology.

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#### TINNITUS AURIUM, AND ITS TREATMENT BY A NEW METHOD OF ALTERNATE INJECTION AND EVACUATION OF AIR.

Admitting that we know of no specific for the cure of tinnitus aurium, DR. JOHN WARD COUSINS maintains that the removal of this symptom must depend wholly upon the successful treatment of the special morbid process by which it is excited (*British Med. Journal*, March 26, 1887).

In speaking of the treatment of tinnitus dependent upon disease of the middle ear, he says "that theoretically the treatment of this form of tinnitus is a very easy matter, and simply consists in promoting free and healthy communication between the tympanum and the pharynx, and so restoring the normal balance of pressure on both sides of the membrana tympani." Pent-up fluids must be removed, and the mucous membrane stimulated to healthy

action. If collapse of the membrana and immobility of the bones exist, our efforts must be directed to promote the normal elasticity of these parts, and reestablish their intrinsic movements. If the Eustachian tubes are obstructed by secretion, our remedies must be employed for the purpose of clearing the canals, and restoring the normal condition of the nasopharynx and throat.

In the early stages the use of the simple air douche will render good service, but in chronic cases Dr. Cousins prefers "the injection of air and its immediate evacuation. Sometimes the air is medicated by the vapor of some volatile substance, for the purpose of reducing the sensibility of the cavity and stimulating the mucous surface." To accomplish this purpose, an apparatus of his own invention is employed. It consists of two parts: 1. A special nasal piece, for hermetically closing the nose; 2. Two powerful hand-balls, which are connected with the former by an India-rubber tube. The nasal piece is composed of two tubes, with their extremities inclosed in inflatable bags made of very thin and soft rubber. The inflating tube has a separate connection with the lower part of each bag. The hand-balls are fitted with recoil springs, which impart force and rapidity to their expansion. One hand-ball is marked for injection, the other for evacuation, and their converse action is obtained by simply reversing the valvular arrangement, so that the outlet valve is fixed to the connecting tube on one side and the inlet valve on the other. The air injected may be medicated by dropping some selected fluid on cotton placed in a conical vulcanite receptacle at the distal end of the injecting tube. The alternate method of inflation is claimed by its author to have many advantages over the ordinary methods of inflation. Sometimes relief is given by one operation—as it is, indeed, sometimes by any method—while numerous operations may be required before relief is obtained in other cases. It is asserted that this method promotes the immediate discharge of pent-up secretion in the pharynx, and aids in establishing the drainage of the tympanum. "In chronic cases the mobility of the bony chain has been long impaired by the morbid condition of the middle ear; but by gentle repeated agitation in both directions, the adhesions between the ossicles are loosened, and their normal oscillation restored, so that sonorous vibrations can be again transmitted from the drum to the fluid within the labyrinth."

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#### ABSCESS IN THE BRAIN RESULTING FROM DISEASE OF THE EAR.

DR. THOMAS BARR, of Glasgow, has contributed a most interesting and valuable article on this topic, in the *British Medical Journal* of April 2, 1887.

It is admitted at the outset that where abscess of the brain is not caused by an injury, it depends usually upon some preëxisting purulent centre, and this is most frequently in the ear. This is most usually in the middle ear, and it is held that the published accounts of internal ear inflammation, as the source of cerebral abscess, are erroneous. The nature of this disease is a chronic purulent inflammation in the lining membrane of the tympanic cavity, mastoid antrum, and mastoid cells. While there is a general consensus of opinion that ear-disease is the most frequent cause of cerebral abscess, Dr. Barr tries to show, successfully we think, that it is more frequently the cause than is even supposed. In a synoptical record of 76 cases (Sir William Gull and Dr.

Sutton, in Reynolds's *System of Medicine*, 1872), 27 cases, or more than one-third, were set down as due to ear disease. Lebest (*Virchow's Archiv*, 1856, vol. x.) gives 1 in 4 as the proportion, based upon 80 cases of cerebral abscess. But in many cases not attributed to the ear, given by these authors, Barr claims that the ear evidently had not been examined, "while in a goodly number the disease was said to have originated in a blow, which may be quite compatible with its real origin in ear disease." In 10 of the cases in the article in Reynolds's *System of Medicine*, no reason is given for the cerebral abscess. "We know that up to the time at which these articles were prepared, the hearing organ was very little examined, either in the clinical wards or in the post-mortem room." Coupled with the fact that purulent disease in the ear may exist without the knowledge of the friends of the patient, or of even the patient himself, Dr. Barr believes we are not in a position to state that 47 cases in these 156 of cerebral abscess are all that were due to chronic purulent disease of the ear. He thinks that from what is now known, that fully one-half of all cases of cerebral abscess are due to purulent disease of the ear. "As medical men come to use the ear-speculum in every case presenting symptoms of cerebral disturbance, the frequency with which ear disease leads to a fatal issue will be found to be greater than has hitherto been suspected."

The most frequent situation of the abscess seems to be in the temporo-sphenoidal lobe of the cerebrum. In 76 cases tabulated by Dr. Barr, 55 cases, or 73 per cent., were in the so-called middle lobe of the brain; 13 were in the cerebellum; in the cerebrum and cerebellum, 4; in the pons Varolii, 2; and in the crus cerebelli, 1. The disease is propagated from the ear to the interior of the cranium by two ways: 1. Most frequently by the roof of the tympanum and mastoid antrum; 2. By the inner wall of the antrum and mastoid cells to the dura mater lining the posterior fossa, and to the cerebellum. In some rare instances pus makes its way from a cerebral abscess into the middle ear, probably through the tegmen tympani. The "otorrhoea cerebrealis," however, of ancient writers cannot be accepted, since the ear disease and not the cerebral disease is the primary affection. Opening the cranial wall by means of chiselling is regarded as productive of concussion to a brain already very sensitive by disease.

"It is quite clear that, in the future, persons suffering from abscess of the brain dependent upon ear disease should not be left to die as they have been in the past, without an effort being made, by opening the interior of the cranium, to reach the brain and drain the abscess. How this can be best done cannot be fully settled until further experience has been gained."

The concluding remark as to prevention is worthy of attention. "When every member of our profession is sufficiently impressed with the importance of chronic suppurative inflammation of the middle ear, and prepared efficiently to treat this disease in all its stages, the occasion for this operation will probably seldom arise."

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#### A CASE OF ABSCESS OF THE TEMPORO-SPHENOIDAL LOBE OF THE BRAIN, DUE TO OTITIS MEDIA, SUCCESSFULLY TREATED BY TREPHINING AND DRAINAGE.

The above named case occurred in University College Hospital, under the care of DR. W. R. GOWERS, and to which he called MR. ARTHUR E. BAKER, F.R.C.S., for surgical aid. (*British Medical Journal*, Dec. 11, 1886.)



The patient was a man nineteen years old. In all respects his health had been good until 1875, when he had scarlatina, which left him with a discharge of thin, yellowish fluid from the right ear. In August last (1886) he suddenly began to feel unwell and complained of pain behind and around the right ear. In the course of ten days he took to his bed, his temperature running up to 105° F. The next day the temperature fell to 103° F., then to 99.4° F., without constipation or diarrhoea. At the time of his admission to the hospital there was no impairment of the nervous system. There was, however, double optic neuritis, slight, but unequivocal. The hearing, taste, and smell are said to have been normal. [The hearing in the right ear must have been somewhat affected after a chronic disease of over ten years.—Reporter.] There was a fetid discharge from the right ear. Urine healthy. Evening temperature 101° F. The next day temperature as low as 96° F. and pulse 52. On the fifth day after admission, Mr. Barker examined the ear and found a large perforation in the right membrana tympani, in the anterior and upper segment. The middle ear was filled with a thick, fetid purulent debris. There was no sign of acute inflammation or tenderness about the ear, or mastoid region.

From the morning of the sixth day after admission, the temperature fell steadily to 97.6° F., on the morning of the eighth day. It varied then between this and 98.8° for a week more. The optic neuritis increased, and the patient grew dull. He had severe vomiting without previous nausea, and his temperature sank to 97.6° F. His pupils were now observed to be unequal, the right being more contracted and sluggish than the left. No headache and no squint. The optic neuritis more marked. On September 27th, twelve days after admission to the hospital, the symptoms were more aggravated, but the temperature remained 98° F. throughout the day. The next day, Mr. Barker decided to open the mastoid antrum and middle ear and search for pus in the latter, and wash it out and drain it, if pus were present. "This was done in the usual way with a gouge, at a point about half an inch above and behind the centre of the external auditory meatus. On opening the antrum there was no gush of pus, but some came away on the instrument; on injecting the meatus, a quantity of curdy and very fetid material was forced out of the opening in the bone; and on inserting a syringe into the latter, similar matter welled out of the meatus. Having then thoroughly washed out the middle ear with carbolic lotion, the whole area of operation was dusted with iodoform and dressed with salicylic wool, a drainage tube being left in the opening."

The next day the patient was decidedly better, though still slightly drowsy; the right pupil did not dilate as fully as the left. Temperature 98.4° to 99° F. Wound dressed with boric acid fomentations, and drained well. The next day the patient felt better and was brighter. There was no pain. "The pupils, however, remained the same, and the optic neuritis was steadily increasing." Temperature 98.6° F.

On the third day after the operation a silver drainage tube was substituted for the rubber one, in the mastoid opening. On the next day, the patient was not so well, having had a restless night. There was no pain, but the patient vomited in the morning. Bowels confined; drowsy. Temperature 98.8° to 97.8° F. On the third day the patient was still drowsier, having been slightly

delirious during the previous night. He also vomited, but had neither headache nor squint. On the fourth day he felt drowsy, and on the next day more so. Temperature was normal. While the ear was being syringed there was well-marked nystagmus to the left, in both eyes, which ceased immediately on discontinuance of syringing. In the evening the temperature rose to 105° F., and the patient had a rigor lasting forty-five minutes. The rigor and the intense optic neuritis, in connection with the negative result of the previous exploration, were held to indicate the presence of a cerebral abscess, and Mr. Barker was asked to trephine and search for one in the temporo-sphenoidal lobe. This was done on the same evening. In the first place, the auditory canal, the mastoid wound, and the middle ear were washed out with a solution of carbolic acid (1 to 20) and then dusted with iodoform. A V-shaped incision was made by joining the incision previously made over the mastoid by one running from behind and above, downward and forward. Beneath this flap the bone was found to be healthy. A spot was then chosen for the pin of the trephine, an inch and a quarter behind, and an inch and a quarter above the centre of the meatus of the auditory canal. The region of the foramen of the mastoid vein was thoroughly examined and found normal. This point is always examined by Mr. Barker before opening the skull in cases of intracranial suppuration, because it is claimed that "if there be inflammation on the posterior aspect of the petrous bone, it can hardly reach the cerebellum without forming a layer of pus under the dura mater of the lateral sinus. If this is so, the pus will escape by the mastoid foramen, if the latter be exposed."

The trephine was then used at a point corresponding to the inferior posterior angle of the parietal bone, close to the squamosal suture. The dura mater was found to be quite normal. The membrane was then divided with a knife and turned back, when the surface of the brain was seen to be unaffected, nor was there any fluid in the arachnoid space.

The whole wound and the opening made by the trephine having been again thoroughly washed by a strong solution of carbolic acid and dusted with iodoform, Mr. Barker thrust a hollow aspirator-needle, about the size of a No. 4 catheter, into the temporo-sphenoidal lobe, in a direction inward, forward, and downward. This was done slowly, and when the point had reached a spot about half an inch inward from the surface of the brain, a bubbling sound was heard, followed by thick, yellow, intensely fetid pus, to the extent of four and a half drachms. No more pus escaping through the needle, the cortical wound was slightly dilated, and two or three drachms of pus escaped. The entire area of the wound was then washed and dusted with iodoform, as before, and a rubber drainage tube, two inches long, also dusted with iodoform, was inserted for an inch of its length into the abscess. The V-shaped flap was cut away at its base, so as to leave the trephine hole free for drainage. In a fortnight after the operation, the drainage tube was left out of the wound and the patient allowed to get up. On the third day after the operation a silver tube was substituted for the rubber tube, the latter not staying well in place. The optic neuritis was now greatly improved and disappeared entirely in about three or four weeks after the operation.

In thirty-eight days after the trephining (Nov. 25th), the patient left the hospital looking and feeling very well. There was still some purulent discharge from the affected ear.

By December 4, a month later, both wounds behind the ear had healed, and there was only a slight moisture in the fundus of the right ear. There are other data contained in this article most worthy of perusal by those further interested in such an operation.

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#### ON THE SURGICAL TREATMENT OF BRAIN SUPPURATION FOLLOWING EAR DISEASE.

In an article with this title, "the brain-complications which, while possible with an intact membrana tympani, are commonly associated with long-continued purulent discharges from the middle ear, with generally mastoid involvement," are considered by DR. R. F. WEIR, in the *New York Medical Record* of April 9, 1887. In a case of chronic purulent disease of the ear, in a woman, thirty-nine years old, in which the mastoid was operated on, the subsequent cerebral symptoms pointed toward an abscess in the brain. Therefore, the original mastoid perforation was enlarged for half an inch (it had been made just where the mastoid glides into the external canal), and deepened, until the dura mater was exposed nearly the size of a finger nail. Cutting through this membrane, a hypodermatic needle was introduced to a depth of nearly an inch and a half, being directed along the upper part of the petrous bone, and also into the cerebral lobe in this region, but nothing but a little blood was extracted. No result was obtained by this operation. Eleven days afterward the patient became hemiplegic on the side of the affected ear, with a temperature of 103°, an irregular pulse of 68, and there was vomiting. Under these discouraging circumstances a further ineffectual attempt was made to relieve the patient. With a one-inch trephine a button of bone was removed over the left Rolanderic line, and the dura mater incised crucially, and about two ounces of clear cerebro-spinal fluid were let out. Six exploratory punctures were then made with an aspirator, but nothing was detected. The patient was not bettered, but died next day, comatose. An autopsy was refused.

Dr. Weir states that the situation of an abscess in the brain depends to some extent upon the route by which the inflammation extends from the ear cavities, "the condition of long-tarrying pus, however, being by far the most important of all factors in the self-infection." The important surgical fact, however, comes out strongly, from numerous observations of others, that a majority of the purulent depots in the brain from ear disease are encountered in the temporo-sphenoidal lobe, and that after this the most affected locality is the cerebellum. It should also be borne in mind that both of these regions are fortunately of less value to life, and can better tolerate surgical interference, than almost any other portions of the brain. "It is to the fact of their slight motor importance that our power of localizing tumors and abscesses in these regions is so poor, and this consideration leads directly to the remark that the earliest decided evidences of brain-pressure in the disease under question should be acted upon as soon as detected, since their development presupposes an already large accumulation of pus." Surgical interference with the brain is therefore advised, as soon as a mastoid operation has shown itself to be impotent to relieve the symptoms. In this connection it is well to recall the fact that one-fifth of the cases of cerebral abscess die unrelieved by the mastoid operation. The relief sometimes observed after a mastoid



operation, either with or without finding pus, is explained by the supposition that either the cerebral abscess itself has been drained by the operation, or, what is more likely, that an extra-dural collection of matter has been let out by the mastoid opening. In view of these considerations, Dr. Weir believes that, anatomically and surgically, no reasons exist adverse to an early opening of the dura and draining the fossa in cases of suppurative meningitis of the middle fossa due to aural disease. When symptoms are present by which the probable site of the purulent collection can be located, whether in the temporo-sphenoidal lobe or in the cerebellum, the surgeon will be guided largely by the neurologist. The cerebellar region is not regarded as inaccessible to surgical treatment, and therefore the advice is given that if the cerebral abscess can be excluded in favor of an abscess in the cerebellum, there should be no hesitation in operating below the tentorium through the occiput. The guide in operating on the cerebellum, given by Mr. Barker,<sup>1</sup> should be remembered, viz., to expose the opening of the mastoid vein, where, if pus has spread backward to the cerebellum from the ear, some of the discharge will be found oozing from beneath the dura, at this opening in the masto-occipital region. Much of a minute and specific nature is given in this paper by Dr. Weir, and should be carefully read by all contemplating an operation for the relief of an abscess in the brain.

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## DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

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UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

PROFESSOR OF DISEASES OF THE THROAT AND CHEST, PHILADELPHIA POLYCLINIC.

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### DIPHThERIA.

To favor syringing the nasal passages, REIERSON, of Copenhagen, passes medicated bougies which melt in an hour, and reëstablish the patency of the passage. For large children and adults they are  $3\frac{1}{4}$  inches in length and  $\frac{1}{8}$ th of an inch in diameter. The formula is cocaine hydrochlorate  $\frac{1}{8}$ — $\frac{1}{4}$ th grain, boric acid 15 grains, starch and powdered acacia each  $1\frac{1}{2}$  grains, and glycerine sufficient. For younger children the bougies are shorter, and contain  $\frac{1}{2}$  grain of the cocaine, or less, and 10 grains of the boric acid. The bougies should be stiff, and be pointed at one end. One is introduced into each inferior meatus. They should reach as far as the nasopharynx.—*Journal of Laryngology*, Jan. 1887.

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### INTUBATION OF THE LARYNX.

DR. A. CAILLÉ, of New York, reports (*Medical Record*, March 19, 1887) a successful case in a child five years of age, with diphtheritic laryngeal

<sup>1</sup> Alluded to already in this report.

stenosis. Attention is called to a Dr. Denhard's important modification of the gag, but this is not described.

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#### EARLY TRACHEOTOMY IN DIPHTHERIA.

MR. W. WATSON CHEYNE (*Brit. Med. Journ.*, March 5, 1887) believes that the indication ought not to be obstruction to the respiration, but that tracheotomy ought to be performed in cases of diphtheria as soon as it is certain that the larynx is affected; and chiefly with the view of preventing the spread of the membrane downward. This he claims to do by inspecting the incised trachea, removing any semblance of membrane if present, and, membrane or no membrane, applying a 1 in 500 solution of bichloride of mercury.

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#### LUPUS OF THE NOSE AND RHINOLITHS.

DR. L. V. SILITCH, of St. Petersburg (*Vratch*, No. 1, 1887), reports two instances of calculi removed from patients with lupus of the nose.

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#### MUCOUS POLYPI IN THE RIGHT ANTRUM.

DR. SHAEFFER (*Monatschrift für Ohrenheilkunde*, etc., 1886, No. 11) describes an instance in a female, fifty-nine years of age, for sixteen years the subject of nasal polypi. Eight or ten dense, small polypi were removed by scraping the antrum with a sharp spoon, access being through the socket of the second molar. At the date of the report severe neuralgic pains, supraorbital, infraorbital, and alveolar, had continued relieved for four months.

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#### CYST OF THE NASAL MUCOUS MEMBRANE.

SCHAEFFER (*Monats. f. Ohrenheil.*, 1886, No. 11) reports a cyst the size of a walnut, involving the anterior portion of the lower right turbinate body and the floor of the nose of a woman, fifty-four years of age. It was opened by a large incision made upward behind the upper lip, and discharged a tablespoonful of albuminous fluid, with a few flakes of pus. The cavity was cauterized with chromic acid, and a drainage tube inserted. Contraction of the cavity necessitated removal of the tube the next day. Recovery was complete in eight days.

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#### NASAL AND NASOPHARYNGEAL REFLEX NEUROSES.

DR. P. MCBRIDE, of Edinburgh, in a lecture reported in *The British Medical Journal* of January 29, 1887, traces the recent history of the literature on this subject, coming, among other conclusions, to the following: That application of the actual cautery to the nasopharyngeal mucosa is no less effective than cauterization of other parts which has been known to cure such neuroses, and may be more so; that we have no means of knowing, in any given case, whether it can be cured by treatment to the nose; that weakness of voice accompanying granular pharyngitis may be purely reflex, and that electricity to the larynx may be indicated rather than destruction of the granulations. A tolerably complete bibliographic index is appended.

## STRICTURE OF THE ŒSOPHAGUS.

In a female forty-nine years of age, whose symptoms had been those of chronic gastritis with emesis, the œsophagus, for nearly its entire length, was found by DR. J. W. ROOSEVELT, dilated to about the bulk of a quart. (*Medical Record*, March 12, 1887.)

In an article on the treatment of malignant stricture of the œsophagus by tubage or permanent catheterism, by MR. CHARTER J. SYMONDS (*Brit. Med. Journ.*, April 23, 1887), he reports four personal observations, having had eight cases under prolonged treatment. He prefers dilatation with bougies so long as solids can be swallowed; then the use of a short rubber tube, removed from time to time, until fluids can no longer be taken; and then resort to Krishaber's long tube, or to gastrostomy.

## PULSATING ARTERIES OF THE PHARYNX.

DR. J. W. FARLOW, of Boston, presents (*Journal Amer. Med. Assoc.*, April 2, 1887) a record of five cases of large visible pulsating artery on the posterior wall of the pharynx, with remarks. All five were in females, the ages being four, thirteen, eighteen, twenty-three, and thirty years.

## LARYNGECTOMY.

MR. LENNOX BROWNE, of London, has reported (*Brit. Med. Times*, February 5, 1887) a successful case of partial excision of the larynx, on account of intra-laryngeal epithelioma in a man sixty-one years of age. One-half of the larynx was removed.

DR. D. HAYES AGNEW, of Philadelphia, reports (*Med. News*, April 9, 1887) a case of total extirpation for epithelioma. Death ensued on the second day from exhaustion.

Extirpation of the larynx for carcinoma was performed by DR. J. H. BRANHAM, of Baltimore, on January 20th (*Maryland Med. Journal*, February 5, 1887, p. 356). Death ensued within thirty-six hours from "aspirating" pneumonia. In this case, as in Agnew's, unsuspected infiltration of the œsophagus was revealed during the operation.

DR. W. GARDNER, of Adelaide, South Australia, reports (*Lancet*, May 7, 1887) a case of excision of the epitheliomatous larynx in a male, aged sixty. Three months later the disease had reappeared.

## FIBROSARCOMA OF THE NASAL SEPTUM.

MM. CALMETTES and CHATELLIER report (*Annales des maladies de l'oreille du larynx*, etc., Mars, 1887) a case in a married woman, thirty years of age, successfully removed by operation with the incandescent electric loop. Eleven months later there had been no recurrence.

## BLACK TONGUE.

DR. PH. SHECH, of Munich (*Münchener med. Woch.*, No. 13, 1887), reports a case in which he examined microscopically a portion of the product cut as



close to the base as possible. He found it composed of excessively elongated, pigmented, and fully cornified filiform papillæ, but failed to find the special mycophites described by some observers. He concludes that the black tongue belongs to the category of hypertrophic, and not of mycotic, diseases.

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#### PHARYNGITIS SICCA.

DR. E. J. MOURE, of Bordeaux, recommends (*Revue mensuelle de laryngologie*, etc., Avril, 1887), among other treatments, pencillings with a mixture of tincture of capsicum, one part in fifty to one hundred of glycerine.

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#### LARYNGEAL MEASUREMENTS.

DR. MOURA, of Paris, concludes in the April number of the *Revue mensuelle de laryngologie*, etc., his exhaustive and laborious series of measurements of the various laryngeal structures in males and females in his critical studies of the anatomico-physiological conditions of the human voice. A series of tables presents the statistical records of the observations described at length in the text.

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#### ATROPHIC RHINITIS.

DR. NOQUET, of Lille, in some considerations on this theme (*Revue mens. de lareto*, Mai, 1887), claims to cure the disease in many instances, even to regeneration of the atrophied tissues. He uses Weber's douche twice a day, with a tablespoonful of potassium chlorate to the litre of tepid water, followed by pulverization of a solution composed of chloral hydrate, 1 part; boric acid, 12; glycerine, 20; distilled cherry-laurel water, 40; and distilled water, 400 parts. In the middle of the day an additional pulverization is practised with water aromatized with antiseptic vinegar, in the proportion of about one to fifty. After eight days carbolic acid replaces the potassium chloride, in the proportion of about two grammes to the litre. In addition, pencillings are made by the attendant with a solution of zinc chloride (20:100?), rendered limpid by the addition of a small quantity of chlorohydric acid.

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### DERMATOLOGY.

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#### UNDER THE CHARGE OF

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AND

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#### ICHTHYOL.

ELLIOT contributes (*Medical Record*, March 19, 1887) a comprehensive paper on his experience with ichthyol in the treatment of cutaneous diseases. He finds that the two ichthyol preparations—ammonium ichthyol and natrium

ichthylol—differ in their action, often considerably. As a rule, better results are to be obtained by the soda preparation. In cases of simple acne, acute or subacute in type, the natrium compound was without result. It was given internally in doses of four to eight grains three times daily; the ammonium compound gave the same negative results. In acne indurata the natrium ichthylol was also useless, but the ammonium preparation rendered good service. It was applied as a five to eight per cent. solution. Deep-seated, indolent, lumpy lesions were arrested in their development and rapidly disappeared. In spite of its prolonged use and administration, however, new lesions continued to make their appearance. It proved valuable, also, in those cases of acne of the chin in women, usually so obstinate to treatment.

In the treatment of rosacea the results were unsatisfactory. In some cases of eczema its local application appeared useful, but the internal administration of the remedy had no apparent effect, either on the immediate attack or in preventing relapses. In chronic eczema rubrum, especially when on the legs, and depending upon varicose veins, excellent results were obtained by the use of the natrium ichthylol; the ammonium preparation, even in weak percentages, gave rise to pain, burning, and an increase in the inflammatory symptoms. More especially were the favorable effects of the soda compound (three to five per cent. aqueous solution) seen in its keratoplastic action, in this class of cases associated with ulcerations. In seborrhœa oleosa about the nose, the ammonium compound gave good results, if used alternately with other plans of treatment. In intertrigo the natrium ichthylol proved serviceable; the ammonium salt was less valuable. It was used in ointment form, two to ten per cent. strength.

In dermatitis these preparations were also useful. The same good effects in burns of the first and second degree were seen to follow applications of a five per cent. aqueous solution of the natrium salt. In chronic urticaria the administration of the ichthylol salts seemed without value. The same may be said as regards ichthyosis, used both externally and internally. In the after-treatment of lupus, following the use of the nitrate of silver or the curette, an ointment of the natrium compound, five per cent. strength, induced rapid healing. The effect of a five per cent. ointment of the ammonium ichthylol on cicatrices was of a satisfactory character; the parts were rendered more pliable, and also a decrease in size often following.

While admitting the value of the ichthylol preparations in certain diseases of the skin, the author, from his experience, cannot consider them entitled to the therapeutic importance claimed by Unna, Küssner, and other German observers.

UNNA, in a brief note in the *British Medical Journal* of April 9, 1887, reaffirms his opinion as to the value of ichthylol, administered internally, in acne rosacea, nervous forms of eczema in persons of nervous constitution, eczema from teething, lichen urticatus, erythema multiforme, dermatitis herpetiformis, and furunculosis. It is not indicated in psoriasis. After five years' experience with the remedy, Unna states that it is also valuable in acute and chronic rheumatism, bronchial asthma, chronic catarrh of the stomach and intestines, together with catarrh of bile duct (icterus), chlorosis, tuberculosis (especially in children), scrofula, and in vascular engorgements of all kinds. [The dose of ichthylol varies from three to fifteen grains three times daily, preferably administered in capsules.—Eds.]

## AMENORRHŒA, SEPTICÆMIA, AND DERMATITIS MULTIFORMIS.

DR. H. F. KERR (*Virginia Med. Monthly*, January, 1887) reports a case of amenorrhœa, followed by septicæmia, a multiform dermatitis, and death, occurring in a previously healthy girl seventeen years of age. A cold was contracted, the result of dancing and over-heating, after which menstruation ceased, and various general symptoms set in. Three months later, swelling, having a purpuric aspect, occurred about the face, hands, forearms, and feet, followed soon by numerous distended blebs of the size of large split peas, round and oval in form, containing a clear fluid. Intermingled with the blebs were small, pin-head sized pustules, containing pus of a whitish color. There were itching and burning. In a few days the blebs became covered with yellowish, and later, brownish crusts. The face and forearms were the seat of a thick, adherent mass of crusting, beneath which the skin showed an oily, smegma-like, cheesy product, which, when removed, displayed a bluish sensitive skin. In other regions, as the neck and elbows, the crusts were soft and fatty, and there existed deep and painful fissures. On the flexor surfaces of the arms, hands, and feet, especially, and to some extent over the whole surface, the skin had the consistence and appearance of old leather, being thickened and sclerosed. Later, desquamation occurred in the form of exfoliation, the skin of the fingers and toes coming off like casts. In certain regions, as on the body and the legs, the eruption manifested a squamous type. The temperature and pulse were both above normal. The treatment was expectant. The patient died. Two weeks before death a whitish, jelly-like, odorless discharge took place from the vagina. Previous to this, an examination of the uterus gave no cause for the menstrual suppression.

Dr. Kerr is of the opinion that septicæmia existed as the result of suppression of the menses and absorption of septic matter, and that the cutaneous symptoms, although different in some respects, bear more relation to Dühring's dermatitis herpetiformis than to any other disease.

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IMPETIGO HERPETIFORMIS.

KAPOSI (*Viertelj. für Derm. u. Syph.*, 2 Heft, 1 Hälfte, 1887) is of the opinion that the term impetigo herpetiformis, proposed and employed by Hebra, in 1872, to define a rare and peculiar disease of the skin, should be retained for this affection, of which he has seen thirteen examples. Hebra's observations led him to think that the disease was peculiar to women, and who were either pregnant or were in the puerperal state, a view which has likewise been entertained by Kaposi until now. He has recently seen a case occurring in a man. All of the cases, except one, proved fatal. The paper is illustrated with four handsome chromo-lithographs, several of which are reproductions from Hebra's atlas. The author regards some of the reported cases of impetigo herpetiformis (as those of Heitzman and of Pataky) as examples rather of pemphigus and herpes iris, than of the disease under consideration. He also takes exception to viewing impetigo herpetiformis as a variety of dermatitis herpetiformis, as proposed by Dühring.

Impetigo, it is stated, signifies pustules—that is, efflorescences filled with pus; while herpetiformis, as this term was originally employed by Hebra,



conveys merely the idea that the lesions are arranged as in "herpes"—that is, in groups and streaks or bands (*streifen*), and that the eruption, just as in "herpes," spreads peripherally after undergoing central involution. It would have been better, perhaps, the author thinks, to designate the disease "impetigo circinata et iris," in which case the term herpes would not have appeared in connection with this subject. Herpes has nothing in common with impetigo, the former being defined as an acute affection characterized by *vesicles* (*i. e.*, efflorescences filled with clear, translucent serum), which only in the course of hours or days became cloudy or pustular, together with the appearance of other signs of involution. In impetigo there exist from the beginning pustular vesicles (*eiterhältige Bläschen*), and always only such during the entire course of the disease.

Impetigo herpetiformis is characterized, 1st, by miliary, existing primarily as such, superficial—*i. e.*, *epidermoidal*—pustules; 2d, these, throughout their entire course, manifest the same features; 3d, they are always arranged in groups and aggregations; and, 4th, the lesions appear afresh on the border of older patches, in the form of one or more series, upon inflamed bases, while in the centre involution occurs, but in no case ulceration and scarring. Other essential characters of the disease are found in the exclusive occurrence in pregnant or puerperal women [the case of the author, occurring in a man, is reported later in the article.—Eds.]; the accompanying chills and marked fever; preference of the eruption for certain localities, as the genito-crural region, *mammæ*, and mucous membrane of the mouth; and finally, with one exception, the fatal termination of the disease. The author inclines to the view of the process being pyæmic.

#### TWO EPIDEMICS OF MOLLUSCUM CONTAGIOSUM.

DR. W. F. MITTENDORF, of New York (*Trans. Amer. Oph. Soc.*, 1886), thinks, from his observations in two epidemics of this affection, that there is very little doubt in regard to its contagiousness. The disease occurred in two distinct homes for children on Staten Island. A little girl was admitted to one institution with one or two small "warts" on the eyelids: within a few weeks several of the other girls had the same growths appear on the eyelids, lips, and nose. Three months after the admission of the first case, twenty-seven children, nearly all of them girls, were affected, the lesions in every instance involving the eyelids, and in some other parts of the face, but in no case was the rest of the body invaded.

In the other institution the first case was observed two years ago, and at date of writing, forty-one children were affected, as well as one of the nurses and her child, who lived outside of the nursery. Some of the children were given out to a farmer who boarded them. In a short time the disease had spread to several of the children boarding at this farmer's place, to the child of the farmer, and likewise to his wife, disfiguring her greatly. In a number of instances the tumors, varying in size from a mustard seed to that of a pea, had spread to other parts of the face, but they were usually confined to or more marked about the lids, some being located at the free edge of the lid and among the eyelashes. Three cases of spontaneous cure were noted.

In regard to the treatment, it was found that abscission with curved scissors and touching the base with stick of nitrate of silver was most satisfactory.

MERCK'S CONCENTRATED LACTIC ACID; SOME OF ITS USES IN  
DERMATOLOGY.

In the *Journal of Cutaneous and Genito-Urinary Diseases* (April, 1887) KNOCHE relates his experience with lactic acid in the treatment of tylosis, chloasma, freckles, and warts. In tylosis the acid was applied pure, being well rubbed in. The epidermic masses were soon softened, and easily peeled off, this result following a few days' treatment. The affection tended to recur, but finally, under this treatment, disappeared. In a case of chloasma, the acid was applied diluted with three parts of water; after the second application the surface became slightly inflamed. The inflammation soon subsided, and the epidermis began to peel off in spots. Upon a repetition of the treatment the discoloration was entirely removed. A case of freckles was treated in the same manner with satisfactory results. In the treatment of warts also the author had success; the free acid was applied, by means of a pointed stick, two or three times daily for several days.

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## THE CUTANEOUS PUNCH.

KEYES describes (*Journal of Cutaneous and Genito-Urinary Diseases*, March, 1887) a small punch or trephine which he has employed with success in the removal of powder specks from the skin, in epithelioma, moles, and other blemishes. The instrument is made in several sizes, and has a sharp cutting edge. By pressing it upon the skin and rapidly rotating, a circular piece of skin, corresponding to the size of the instrument used, is cut; this projects, and is snipped off with the scissors. The depth of the cut may be varied according to the amount of pressure made. As an after-dressing the author used chiefly powdered subsulphate of iron. In cases in which the smallest sized punch was used the scarring was scarcely perceptible.

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## ACTINOMYCOSIS OF THE SKIN.

MAJACCHI (*Monatshefte für prak. Derm.*, No. 7, 1887) was the first to describe a case of actinomycosis of the skin, occurring in a young woman, in 1882 (*Rivista clin. di Bologna*). A second case is now reported by this observer, in the person of a child, seven years old, the disease being in the neck in the form of two ulcers with scrofulous aspect. Between the granulations were found numerous sulphur-yellow masses, some of which were hard and chalky, and could be readily removed without pain or causing bleeding. Microscopic examination showed a large number of actinomyces surrounded by young granulation tissue. Under the use of mercurial ointment, and later iodoform, the wounds healed in about six weeks, without a return of the disease. The case observed in 1882, manifested itself in an anthracoid form with purulent necrotic products, together with pyogenic microorganisms in addition to the actinomyces, causing septicæmia and the death of the individual.

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## DERMATITIS VENENATA.

DR. J. S. HOWE (*Bost. Med. and Surg. Journ.*, March 10, 1887) calls attention to the poisonous effects upon the skin of *leucanthemum vulgare*, known

in different localities as white daisy or field daisy, which is plentiful in New England and in the middle Atlantic States. Four cases of severe dermatitis are detailed, the eruption closely resembling in character that resulting from rhus, dogwood, and sumach. It would seem that the inflammation is particularly liable to attack those who are subject to dermatitis from rhus, etc.

#### CHRONIC ZOSTER.

DR. LEUDET (*Archives Gén. de Méd.*, January, 1887) believes, with Verneuil, that zoster may present itself in several forms; thus, it may be acute, transitory, and without apparent gravity, leaving behind it pains of longer or shorter duration, and disappearing without leaving trace. Another time the eruption may persist over a period of months, and the ulceration which succeeds the vesicles may be deeper, or, after cicatrization sufficiently rapid, the scar may ulcerate anew, and the process repeat itself several times. Sometimes it is limited to the relapses of ulceration. At other times the ulceration is accompanied with redness, swelling, and a neuritic pseudo-phlegmon, as Hamilton has described. Finally, the ulceration may cicatrize and give place to keloid, which may be regarded as a truly chronic zoster.

A second form is that which the author denominates "relapsing zoster *in situ*." A third form is characterized by successive extension upon several branches of the same nerve or upon contiguous nerves. Finally, the fourth form may be called "zoster at a distance," and in these cases the herpetic eruption spreads out upon one or another nerve distant or may be secondary to a lesion of a nerve filament, without apparent anatomical relation to that where the eruption manifests itself. This classification is similar to that put forth by Verneuil, who describes three forms of zoster: 1st. The peripheric or centrifugal; 2d. The traumatic in proximity; 3d. The traumatic at a distance.

Leudet's conclusions (based upon an experience of eighty-five cases, extending over thirty years) are summed up as follows:

1. Zoster, in medical diseases, as in traumatism, may be: *a*, the expression of a local lesion, manifesting itself upon the peripheric branches of an altered nerve; or, *b*, it may make its appearance at a distance in general diseases, calling forth the lesions on the peripheric nerves; or, *c*, it may be chronic *in situ*, relapsing successively upon the nerves and branches in direct anatomical communication with the primitive branch attacked, or upon distant branches; *d*, it may, moreover, be the effect of poisoning, as by carbonic oxide.

2. The anatomical cause is a lesion of the intervertebrate ganglia, of the Gasserian ganglion, and of the peripheric nerves, or of these latter only.

3. Local lesions of the pleura, of the lung, of the spinal column, of the spinal meninges, of the cord, of the brain, are such as have occasioned zoster in the classical observations of Bærensprung, Charcot and Cottard, Chandelux, and others. Chronic pleurisy and tuberculosis of the lung should figure among the most frequent causes of zoster (20 out of 86 cases).

4. Chronic zoster may persist three or even six months. The ulcerations which succeed the vesicles may reproduce themselves, and sometimes terminate in keloid. Each exacerbation of the ulceration may be accompanied with redness and swelling.



5. Frontal zoster may be called forth by an exacerbation of pulmonary tuberculosis, and by the paralytic or convulsive accidents which have been described in empyema.

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## MIDWIFERY AND GYNECOLOGY.

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UNDER THE CHARGE OF

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### COMPLETE INVERSION OF THE PUERPERAL UTERUS: THREATENED GANGRENE, AND CURE BY LAPAROTOMY.

SCHMALFUSS records in the *Centralbl. für Gynäk.*, No. 46, 1886, a case of inversion of the uterus after labor. Partial gangrene of the uterine wall was present, and, therefore, abdominal section was performed as Thomas, of New York, has recommended, so that replacement might be brought about with as little force as possible. With careful antiseptic precautions the abdomen was opened and the funnel-shaped portion of the inverted uterus drawn up. The funnel was dilated with the finger and pressure made through the vagina on the fundus by means of a sponge on a sponge-holder. Reversion was easily performed in this way, the uterus washed out with cold boracic lotion, and the vagina tamponed with iodoform gauze. Recovery was complete.

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### DEFECTIVE SANITATION AS A CAUSE OF PUERPERAL DISEASE.

PLAYFAIR, in the *Lancet* of Feb. 5, 1887, draws attention to the fact that sewer gas may cause in puerperal patients attacks of illness indistinguishable clinically from ordinary puerperal septicæmia. The following illustrative cases were given:

*Case I.*—Temperature 104° for six weeks; pyæmic abscesses two months afterward. The defects in drainage were leaking of soil pipe, leaking brick drains, and defective joints with soaking of sewage. Further, the lady's bedroom, boudoir, and water-closet were continuous. The curious fact is further mentioned that in a favorite professional street in London there have been seven cases of puerperal septicæmia, with two deaths, in five years.

*Case II.*—Patient had dangerous septic disease, while her husband had also diphtheritic sore throat. The waste pipe of the bath-room, which was close to the bed, opened directly into the main drain, which was thus ventilated into the dressing-room.

*Case III.*—Lady had well-marked septic symptoms in her second confinement. On examination it was ultimately found that what seemed to be a wardrobe in the bedroom was really a water-closet; it had a special soil pipe carried through the centre of the house and opening directly into the main drain. It was really a costly means of ventilating the main drain into the sleeping apartment.

In all the cases removal from the infected house was followed by good results.

## TREATMENT IN CASES OF ABORTION WHERE THE PLACENTA IS RETAINED.

BUDIN, in a recent lecture delivered at the Academy of Medicine, considers the treatment in cases of abortion where the membranes have been retained; the dangers of such retention are hemorrhage and septicæmia. The ordinarily accepted treatment by immediate removal, either by the finger or curette, he criticises unfavorably, and then proceeds to discuss

1. *Is retention of the placenta really a source of frequent accident?*
2. *Are the digital and instrumental procedures for the removal of the placenta quite inoffensive?*

In 210 cases at the Charité and Maternité the placenta was retained in 46 cases (22 per cent.). When the abortion was complete the mortality was almost nil.

In the incomplete cases the results were good; one patient died from septicæmia. Budin quotes several cases of death or of cellulitis, peritonitis, and endometritis following active removal of the placenta, either manually or by the curette. He recommends, therefore, the vaginal antiseptic plug against serious hemorrhage, and vaginal, or, if necessary, uterine antiseptic douches when septic symptoms arise. The antiseptics recommended are corrosive sublimate 1 : 2000 or 1 : 3000, and carbolic acid 2 : 100 or 3 : 100.

[Budin is so careful and accurate an observer, and one so thoroughly imbued with the principles of antiseptics, that any recommendation from him is worthy of all attention. At the same time I cannot indorse his treatment. In many cases of retained placenta after abortion I have always removed the retained portions at once and douched the uterus with an antiseptic. Where the cervical canal has not been sufficiently dilated I have used Hegar's dilator to complete this. The retained portions can thus be removed bimanually as follows: The patient is chloroformed and placed in the dorsal posture. The right hand is then passed into the vagina and the index finger into the uterus, which is grasped by the left hand so as to steady and fix it. The finger can now easily separate bulky remains, and any shreds can be curetted out. I have never had any result but perfect recovery, with no inflammatory sequelæ.]

## THE TREATMENT OF UMBILICAL HERNIA.

OLSHAUSEN believes (*Arch. für Gynäk.*, Bd. xxix. Heft 3) that umbilical hernia is fatal unless operated on, despite the statistics of Lindfoles, who records twenty-seven cases of cure by pressure or the ligature. Olshausen, in fifteen cases, has seen no instances of preservation of life unless in operated cases. One child with part of the liver in the sac lived five weeks. When left to nature we usually get destruction of the amnion, tear of the peritoneum, and peritonitis, causing death. The following cases of operation are given:

*Case 1 by Breus.* In this case Breus opened the sac, replaced the hernial contents without difficulty, grasped the opening with forceps, and passed strong silk suture below the forceps. The sac was then cut away above the forceps and cauterized. Cure resulted.

*Case 2 by Felsenreich.* The sac was opened, excised, and the abdominal incision sutured by twelve stitches. Union by first intention.

The cases of Lindfoles and Stadfeldt we omit, and pass on to give the one recorded by Olshausen.

The child presented footling, weighed 4280 grammes, and was 57 cm. long. It had a large umbilical hernia and macroglossia. The cord was 96 cm. long, and was tied about 10 cm. from the umbilicus. The opening of the hernia was about 4 cm., and the sac contained intestine. Half an hour after birth there were bullæ and a slight tear of the sac. Three and a half hours afterward the following operation was performed: An oval incision was made close to the skin margin around the internal opening, and then the skin edge and amnion stripped off the parietal peritoneum (sac). The raw edges of the skin were then brought together, the cut vessels being ligatured. In this way the hernia was reduced with the peritoneum intact. The wound healed slowly but soundly. The child died eight months afterward from intestinal catarrh. On post-mortem, the macroglossia was found to be due to connective tissue hyperplasia. There was also non-descent of the ovaries.

Olshausen finally points out that this operation cannot be practised unless the hernia is replaceable.

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#### A CASE OF GASTROTOMY FOR EXTRAUTERINE GESTATION IN WHICH THE PLACENTA NEVER CAME AWAY.

DR. BRAITHWAITE records (*Lond. Obst. Trans.*, 1886) a case where he performed abdominal section for extrauterine gestation. The fœtus was full-grown, had been dead for three weeks, and was lying quite free in the abdominal cavity, except that a fine membrane cut it off from the intestines which lay above it. The placenta covered the top of the uterus, was not removed, and, so far as could be made out, did not come away afterward. When the patient was examined bimanually some time after the operation, no trace of it could be felt, unless as a small ring of dense tissue at the level of about half an inch from the fundus uteri.

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#### FŒTUS AND PLACENTA OF EXTRAUTERINE GESTATION REMOVED BY ABDOMINAL SECTION.

DR. HERMAN describes (*Lond. Obst. Trans.*, 1886) a case where he removed an extrauterine fœtus by abdominal section. The fœtus lay enclosed and adherent to its membranes, the liquor amnii having been absorbed. The placenta was attached to the anterior abdominal wall, upper surface of bladder, and left broad ligament. Dr. Herman tied and divided muscular adhesions between placenta and omentum, and separated, by tearing, the placenta from the bladder and abdominal wall. The part of the placenta adherent to the broad ligament was treated by tying the latter in two parts, and then cutting away the placenta. In this way the ovary had to be removed.

The fœtus weighed 3 pounds 8 ounces, and was compressed and flattened. The weight of the placenta was 28½ ounces; the cord was shrivelled, and the placenta seemed made up of placental tissue with extravasated blood between the tufts.

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#### A CASE OF REMOVAL OF BOTH OVARIES DURING PREGNANCY.

MR. KNOWSLEY THORNTON (*Lond. Obst. Trans.*) records a case where he removed both ovaries at the fourth month of pregnancy. The operation was



performed in the usual manner, the ligatures being placed on the pedicles as far from the uterus as possible. This was done with the intention of avoiding the metrostaxis which usually comes on when both ovaries and tubes are removed, as it might hence set up abortion.

The patient recovered, and was delivered at the eighth month of gestation of a healthy child; the third stage was normal. Lactation was performed satisfactorily, although the uterus was atrophic four months afterward, and the mother had the usual menopause phenomena. The case further shows that the ovaries can have no influence in starting labor.

#### ON MERCURIALISM IN LYING-IN WOMEN UNDERGOING SUBLIMATE IRRIGATION.

DAKIN, in the *Lond. Obst. Trans.*, 1886, makes a valuable contribution to the question of mercurialism following the use of corrosive sublimate as an antiseptic. As is now well known, Tarnier, in 1882, was the first to use this drug as an antiseptic in puerperal cases. The general outcome of its use has been a great diminution in the mortality and morbidity of maternities, a result somewhat clouded by occasional cases of poisoning with even fatal results, as many as eight deaths having been reported. The cases known are as follows:

1. *Stadtfeldt's case.* One intrauterine injection, 1:1500, five days after labor. Death on eleventh day. Kidney and intestinal changes found.
2. *Somer's case.* Vaginal, 1:1000.
3. *Winter's case.* Intrauterine douche, 1:1000; vaginal afterward of 1:1000. Death on fourth day. Post-mortem, gangrenous colitis and peritoneal exudation.
4. *Vöhtz.* Intrauterine injection, 1:750, after abortion. Death on eleventh day after intestinal and kidney symptoms.
5. *Partridge.* Two intrauterine injections, 1:2000; dysenteric symptoms and death.
- 6 and 7. *Thorn.* Intrauterine douche after missed abortion, 1:1000; vaginal douche, 1:1000 in forceps case. Renal and intestinal lesions.
8. *Ziegenspeck.* Death on thirteenth day after three injections of 1:5000. No bad symptoms until second intrauterine douche on eighth day; patient died five days afterward.
9. *Netzel.* Intrauterine douche, 1:1500, on seventh day; abdominal pain then complained of; renal symptoms with albumen and lime salts in urine. Death on twenty-second day.
10. *Gustav Braun.* Douche during first stage; episiotomy performed during second stage, and intrauterine irrigation, 1:1000, after expulsion of placenta. Diarrhœa on third, and collapse on seventh day.
11. *Hofmeier.* One douche of 1:1000. Death on sixth day.

In all cases of douching Keller found mercury in urine, and also albumen.

Dakin then gives the results of the use of sublimate irrigation in 170 patients confined in the General Lying-in Hospital, London, under the charge of Dr. William P. Champneys. The sublimate is used as follows: Hands and instruments are disinfected with 1:1000; the vagina is douched after labor with 1:2000, two pints, at a temperature of 115°–120° F., being

used. For the first two days three pints of 1:2000 at 110° F. are employed, and then the strength is reduced to 1:4000. The patient occupies the dorsal posture, and after the douche is finished turns on her hands and knees, to evacuate any residuum.

Symptoms of poisoning usually appeared between the fourth and seventh days, and were usually diarrhœa, with blood and tenesmus, sometimes vomiting, patchy tongue, thirst and loss of appetite, fetor of breath, salivation with tenderness of teeth and gums, as well as red line on gums. The urine contained albumen in 11 of the cases.

Details of the one fatal case are given, with examination of kidneys.

He comes to the conclusion that a strength of 1:4000 is sufficient for douching.

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#### CASTRATION IN NEUROSES.

SCHRÖDER (*Zeitschrift für Geb. und Gynäk.*, Bd. xiii, Hft. 2) first points out that his disagreement with the views of Hegar in this question is only partial. With Hegar, he agrees in separating the cases where one removes diseased ovaries from those where the ovaries are removed to bring on the menopause. In the first class of cases the indications present no difficulty. No one can dispute that it is right to remove ovaries when diseased. The only point on which opinions can differ is as to whether the disease is severe enough to demand extirpation. This class, of course, includes ordinary ovariectomies, but one has as much right to remove a chronically inflamed ovary when dangerous to life or causing pelvic inflammatory mischief. When one ovary is thus affected, it alone should be removed; and it may be possible to remove only part of it. Schröder would, with Martin, include these with ovariectomy cases, thus separating them from castration.

The second class is quite different, as one must remove both ovaries completely; not because they are diseased, but to bring on the menopause. Schröder further points out that the effect of the removal of the ovaries or fibroids must be settled by experience, and criticises the view that neuroses are associated with pathological changes in the ovaries. Hegar admits that the nervous disturbance does not in any way agree with the severity of the pathological changes, but Schröder goes further, and alleges that the hitherto demonstrated changes, either clinical or anatomical, have nothing to do with general neuroses.

Schröder next points out the difficulty of diagnosing minor changes in the ovaries, even with Schultze's method, and alleges (quite truly) that our knowledge of the pathological anatomy of the ovary, apart from tumor formation, is practically a blank, and that there is, therefore, entirely wanting a scientific basis for castration so far as the pathological changes in the ovary are concerned. Schröder has performed castration for neuroses ten times, but gives the result in only four, where the time since operation has been long enough to enable one to judge. He points out here that the immediate effect may be good, but that ultimately a relapse to the old condition takes place. The results in the four cases were good; no special pathological changes were found in the ovaries removed.

## A CASE OF CURED PERITONEAL TUBERCULOSIS.

POTEN (*Centr. für Gynäk.*, Jan. 15, 1887) first draws attention to Hegar's monograph on genital tuberculosis, and to the statements in it as to the cure or arrest of diffuse miliary tubercle of the peritoneum by laparotomy. He points out that it must be shown in each case that the affection is really miliary tubercle, and not a granulating affection of some other sort. This can only be settled, of course, by the discovery of miliary tubercle and the bacillus tuberculosis on microscopic examination.

König, in some cases of peritoneal tuberculosis, treated with carbolic acid and iodoform, found miliary tubercle present on microscopic examination; but there is no information as to the presence of bacilli. Poten then records a case of peritoneal tuberculosis in a woman where bacilli were found. Frau K., twenty-nine years of age, had three children, the last a year and a half before. During the suckling of her youngest child had swollen limbs, which continued after weaning. Afterward swelling of the abdomen began, and also some prolapsus uteri. Weakness and wasting were also present.

On examination the abdomen was found markedly swollen, especially at and below the umbilicus. The abdominal walls were somewhat stretched, soft, and could be indented. Fluctuation was distinct, but there was no special hardness. On percussion the note was markedly tympanitic below the liver, dull between the symphysis and a point a hand's breadth above the umbilicus, as well as in the flanks and on change of position.

The anterior vaginal wall was slightly prolapsed, the uterus retroposed, movable, and with no evident tumor attachment. Fluctuation in Douglas's pouch doubtful per rectum. Diagnosis was thus difficult.

On abdominal section clear yellow fluid issued in a stream from the incision. The peritoneum and intestines were then seen to be covered with small nodules of a grayish-red color; uterus and ovaries unaltered in size, but also covered with nodules. All the fluid was removed, a piece of the peritoneum resected for microscopic examination, and the incision closed.

The patient recovered perfectly so far as the operation was concerned, and was, a year after the operation, in good health, with no tubercular affection apparent.

The piece of peritoneum removed was 2-3 mm. thick, and dense in consistence. On section it was grayish-red in color, with yellow specks. The free surface showed little prominences about the size of a millet-seed, and without ulceration; the sheen of the peritoneum was lost. In section perpendicular to the surface, one could see a cellular granulation tissue, which seemed toward the surface more like connective tissue. Tubercles, single and in groups, were present, and most abundant in the deeper layers of the thickened peritoneum; they form the miliary prominences at the surface already alluded to. They show the most varied forms, from simple granulation knots to developed wandering tubercle cells, with central caseation. Abundant fat cells lie near the tubercles and in the loose subserous tissue.

The demonstration of the bacilli was attended with difficulty. In many of the sections no bacilli could be found, but ultimately they were found, though sparingly, in some of the wandering cells. They were usually single, but in one cell two were noted.



## ON PERIUTERINE HÆMATOCELE.

GUSSEROW points out (*Arch. für Gynäk.*, Bd. 29, Heft 3) that of late years our knowledge in regard to hæmatocele has been increased by Kuhn, who showed that we could have extraperitoneal hæmatocele apart from the puerperium; by Gallam, who as early as 1855 pointed out that the greater number of hæmatoceles were due to burst tubal pregnancies; and finally, in regard to treatment, by the clinical work of Zweifel, Martin, and others.

Gusserow then takes up the consideration of eight cases of retrouterine hæmatocele on which he operated.

*Case I.* Frau E., thirty-six years of age, first menstruated when sixteen. The period was regular, and lasted two days; her last period was on September 11, 1885. She has had five children, the last in 1876. After an abortion in 1878 she had pelvic inflammation, which kept her in bed for six weeks. On March 1, 1885, bleeding came on, which lasted till November 7. Great abdominal pains came on then, especially at the right side, but diminished after a practitioner removed some membranous shreds. The pains, however, continued. On the 19th she had severe attacks when the bowels or bladder acted, and therefore sought admission to hospital on the 29th.

On abdominal palpation, the abdomen was soft and painful in both iliac regions. Through the abdominal wall one could feel a tumor on the right lower regions, with an upper convex border reaching as high up on the right as the anterior superior spine and navel. It did not reach as high in the middle line. The posterior fornix was bulged with an elastic tumor and the cervix pushed forward to the symphysis. The tumor could be felt on both sides of the uterus.

*Diagnosis.* Retrouterine hæmatocele. The pains increased, but there was no fever; the abdomen became tympanitic, and there was great difficulty in evacuating the bowels and bladder; while the tumor did not increase for three weeks, neither did it diminish. The posterior fornix was therefore incised, the patient being chloroformed, and a large quantity of black, broken-down blood, as well as fresh and old clots, washed out with salicylic acid. A drainage tube was then inserted, and the vagina packed with iodoform gauze. The patient improved decidedly after this, and the tumor diminished to the size of a child's head.

On December 26 the catheter for washing out passed toward the right into a compartment of the tumor, and evacuated 400 to 500 c. cm. of a dirty fluid, which clotted in part on exposure, contained much albumen, and red and white blood-corpuscles. The patient continued well till January 11, when the swelling again filled, and severe pains came on; menstruation was not present. Pulse 100°, temperature 38.2° C. By injection a considerable amount of fluid was evacuated on the 15th, but the patient's condition did not improve on the 28th. Abdominal section was performed, and the cyst-like walls of the sac stitched to the abdominal walls. A drainage tube could then be passed, and all secretion drained through the vagina. The patient improved until July 3, when she had all the symptoms and signs of perforative peritonitis, viz., distention, sickness, almost imperceptible pulse, etc. All this passed off under the free use of stimulants. Patient was practically well on March 4.

*Case II.* Frau D., thirty-seven years of age. Had nine children; an abortion in 1882, followed by pelvic inflammation. On December 18, 1885, had severe pain in abdomen, with uterine hemorrhage; on January 6 a tumor was felt through the left lateral fornix and in Douglas's pouch. Its upper boundary was above the pubis, and the uterus was to the front, though still retroflexed. Temperature normal.

The tumor was incised per vaginam, and the finger passed into the loose oedematous connective tissue. A considerable amount of dark blood was thus evacuated, and old blood clots removed with a blunt curette. No evidence of extrauterine pregnancy could be found. The edges of the sac were sutured to the vaginal incision, and the cavity packed with loose iodoform gauze. The gauze was removed in a few hours, and a drainage tube passed. Recovery good. Douglas's pouch free, uterus retroflexed and fixed somewhat to the right side. The other five cases are much like the preceding in their history, physical signs, and treatment. All the eight recovered.

The critical remarks given on these cases are as follows: Gusserow believes his cases to have been hæmatomata—*i. e.*, extraperitoneal effusions of blood. Case II. he believes to have been hæmatoma of the left broad ligament. In regard to the diagnosis of the hæmatoma of the broad ligament, he asserts that the important points are that the upper half cylindrical boundary can be felt while handling any tumor case—he felt it in Douglas's pouch. The lateral position of the tumor, and its mobility at first, are also valuable in pointing to this diagnosis. The remaining finger can be passed behind and in front of the swelling, but notes its lateral continuity with the uterus and pelvic wall.

In four of his cases Gusserow suspected extrauterine pregnancy as the cause of the effusion, but found no evidence of this in the blood evacuated. He points out that there need be no fear of septic infection by this operative interference and that by it pains, etc., are immediately removed and the patient cured in a period varying from twelve days to three weeks. The details are as follows: Case 1, cured in three weeks; Case 2, in three weeks; Case 3, in twelve days; Case 4, in eighteen days, etc.

The following was the method of opening the blood effusion. The vagina was first douched with corrosive sublimate solution 1:2000, and then the lowest point of the tumor punctured with a lancet-shaped knife, the incision being enlarged as required. The clots were then washed out with salicylic acid solutions and the walls of the cyst, when distinguishable, stitched to the vaginal mucous membrane. A thick drainage tube was inserted and the vagina tamponed with iodoform gauze.

Gusserow considers this method superior to treatment by laparotomy. He recommends operative treatment only in cases where absorption of the blood is delayed or where the local manifestations are severe. The majority of cases of periuterine hæmatocele are cured with rest in bed.

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#### ON CANCER OF THE UTERUS.

WILLIAMS, in his interesting Harveian lectures (*Lancet*, 1887), defines the term "cancer of the uterus" as meaning a new growth possessing malignant properties—*i. e.*, it possesses the power of invading neighboring tissues and of

reproducing itself in the form of secondary growths in other and distant parts. He recognizes three types of malignant disease, viz., sarcoma, adenoma, and carcinoma. Sarcoma is of the connective tissue type. Carcinoma and adenoma are of the epithelial type. This classification is not perfect, of course, as we may have what looks like a mixed form, and sarcoma may assume an alveolar form like adenoma.

The uterus is considered as divided into three parts, viz., the vaginal portion, the cervix, and the body. The portio lies projecting into the vagina; the cervix is bounded below by this and above by a plane passing through the portion where the characteristic cervical structure ends and the tubular glands of the uterus begin. This, of course, gives also the lower boundary of the body. Dr. Williams condemns rightly the use of the terms scirrhus, encephaloid, medullary, and epithelioma.

*Cancer of the portia vaginalis* is defined as beginning in the stratified epithelium on the vaginal surface or in the transitional epithelium at the os externum. He thus excludes sarcomata and glandular cancer. Eight cases are described in their clinical features and the microscopic examination of the parts removed given. The disease was found to begin at one or several points, not to spread into the cervical canal but to creep toward the vaginal wall, thus advancing superficially in seven of the cases. Seven of the cases were married, but they had less than the average number of children. The earliest symptom was hemorrhage.

Before taking up cervical cancer, the nature of the so-called erosion is considered. A true erosion is defined as being a surface with a structure like that of the mucous membrane of the cervical canal lying in the position usually occupied by squamous epithelium. It differs from cancer in that its epithelium is in single layer, and from adenoma in the glands being comparatively superficial. He believes such erosions to be produced by the glandular epithelium proliferating and then destroying and replacing the squamous epithelium beneath which they lie. The stroma around the glands is also active, being infiltrated with nuclei and small cells. The view advanced differs from that of Ruge and Veit, who hold that the glands in an erosion arise from a change in the deeper layer of the stratified epithelium.

Cancer of the cervix begins in the glands, which increase in number and grow where usually they do not exist. Their epithelial lining proliferates, becomes multiple-layered, and may fill the gland lumen. It may exist in a polypoid, papillary, or nodular form; the two latter forms passing into the substance of the cervix and connective tissue around it—the very worst direction possible from an operative point of view. They avoid encroachment on the uterine body and vaginal walls.

Cancer of the body of the uterus is either adenoma or true cancer, both growing from the gland epithelium. It spreads into the muscular coat and may open into the intestine, or cause inflammatory adhesions. The glands affected are those of the broad ligament or of the connective tissue anterior to the spinal column. In all the cases the disease begins after the menopause, the ages averaging from fifty-three to sixty-three.

Dr. Williams discusses finally the question of radical treatment, and advocates supravaginal amputation for cervical cancer as against total extirpation. For cancer of the body, of course, total extirpation is the only remedy.



## THE ETIOLOGY, PATHOLOGY, AND CLASSIFICATION OF SALPINGITIS.

The question of the pathology of salpingitis has been a matter of controversy between Tait, of Birmingham, and Sänger, of Leipzig. We have no intention of judging between the two combatants, but merely summarize the excellent *résumé* of the classification and pathology of salpingitis given by SÄNGER in a letter addressed to the President of the Chicago Gynecological Society (*Amer. Journ. of Obstetrics*, March, 1887).

Sänger bases his pathology on the germ theory and the anatomical relations of the sexual organs. The genital tract from hymen to frimbriated end of Fallopian tube is exposed to access by organisms which may pass from the external medium to the tubes either along the mucous membrane or through the lymphatics; mischief may also pass from the peritoneal cavity into the tubes.

Various microorganisms have been found in the genital tract, but those considered the cause of disease (pathogenous microorganisms) are not many. Sänger classifies the forms of salpingitis into three groups, as follows:

GROUP I. *Forms of salpingitis produced by known specific microbes.*

1. Salpingitis gonorrhœica, produced by the gonococcus of Neisser.
2. Salpingitis tuberculosa, produced by the bacillus tuberculosis of Koch.
3. Salpingitis actinomycotica, produced by the actinomyces bovis of Ballinger.

GROUP II. *Forms of salpingitis due to specific microbes identical with those producing traumatic infection.*

1. Salpingitis septica.

GROUP III. *Forms of salpingitis produced by specific but as yet unknown microbes.*

1. Salpingitis syphilitica.

GROUP I. Gonorrhœal salpingitis is admitted by all as a form, the only point denied by some being whether the gonococcus of Neisser is the cause of it. All admit that gonorrhœa spreads to the tubes and sets up this form. Sänger shows that the tube becomes distended with pus, chiefly at the abdominal end, while the uterine end becomes thickened; the peritoneum becomes infected by the pus escaping through the ostium abdominale. Gonorrhœa produces only surface suppuration, and any abscesses in the psoas ligament or ovaries are usually septic.

It must not be forgotten that while Neisser's gonococci are found abundantly in the gonorrhœal pus from the cervix, their demonstration in the tubes is difficult, and in some cases of undoubted gonorrhœal salpingitis they have not been found.

Salpingitis tuberculosa is known chiefly through Hegar's work (*AMER. JOURN. MED. SCI.* for April, 1887, p. 586), and is a distinct affection from the caseating pus of a pyosalpinx. This latter should be termed "coagulation necrosis."

Salpingitis actinomycotica is undoubtedly one of the greatest rarities in gynecology, but has been described by Zemann in his paper "Ueber die Aktinomykose des Bauchfells und der Baueingeweide beim Menschen." In this case the tubes were dilated and purulent, with clumps of actinomyces present in the lumen of the tube and granulations in the walls. The fungus had passed from the intestines or vagina. [Descriptions of this fungus will be found in Klein's *Microorganisms* and Woodhead's *Pathology*.]

In the forms of salpingitis known as septica and syphilitica the evidence of their being due to a pathogenic microorganism is not yet complete. It must be remembered that the pathogenous microorganism of syphilis has not yet been discovered, and much has yet to be done in regard to those and septic conditions.

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THE PATHOLOGY OF CHRONIC INFLAMMATORY DISEASE OF THE UTERINE APPENDAGES AS ILLUSTRATED BY THE PREPARATIONS OF SIXTY-THREE CASES REMOVED DURING THE YEAR 1886.

MR. LAWSON TAIT gives, in the *Brit. Med. Journ.* of April 16, 1887, his views of the pathology of chronic inflammatory disease of the uterine appendages, as illustrated in a series of 63 cases operated on by him during 1886.

Mr. Tait recognizes five classes of cases as follows: First, catarrhal; secondly, those produced by the exanthemata at the time of puberty; thirdly, gonorrhœal cases; fourthly, those occurring from inflammatory mischief in the post-puerperal state; and lastly, cases where the uterus is infantile, and the appendages disorganized by inflammatory action.

The following are the statistics of the 63 cases: There was only one death. The gonorrhœal and post-puerperal cases preponderate, inasmuch as 53 of the women were married, and in 3 of the unmarried the cause was undoubtedly gonorrhœa. One case of double pyosalpinx followed the prolonged use of intrauterine pessaries intended to remedy an antelexion.

In every case there was no possibility of the woman becoming pregnant, as in the majority the trumpet of the tube was found glued to the ovary; in others the fimbriæ were coalesced, the ovary remaining free.

In one-third of the cases the exanthemata, usually scarlet fever, had caused the inflammatory condition. The condition of the tubes varied. In the early stages they were intensely congested and friable; in the later cases the appendages were cirrhotic, and few Graafian follicles were present in the ovaries. The nature of the fluid contents varied, but was either cheesy or serous. He did not believe this had much bearing in determining the patient's sufferings; this was due to the adhesions.

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MEDICAL JURISPRUDENCE AND TOXICOLOGY.

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UNDER THE CHARGE OF

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STATISTICS OF CRIME IN EUROPE.

According to the journal *L'Italie (Annal. d'hygiène publique, sr. 3, t. xvii. p. 57)*, the number of individuals, per 100,000 inhabitants, convicted of homicide is in Italy, 8.12; Spain, 7.83; Hungary, 6.09; Austria, 2.24; Belgium, 1.78; France, 1.56; Germany, 1.11; Great Britain, 0.60. In respect of

assaults, with injury to the person, Austria takes the first place with 248 per 100,000 inhabitants; Belgium, 177; Italy, 162; Germany, 129; France, 65; Hungary, 46; and Great Britain only 7. For criminal (immoral) assaults, the numbers are; Belgium, 15; Germany, 14; France, 10; Austria, 9; Hungary, 6.5; Italy, 4; Great Britain, 1.7; Spain, 1. In number of convicted thieves of all kinds, Germany takes the highest place with 222 per 100,000 inhabitants; Italy, 154; Great Britain, 147 (Scotland, 222); Belgium, 128; France, 112; Hungary, 77; Austria, 60; Spain, 56.

If the figures for the various crimes are added together for each country, it appears that Germany has the greatest amount of criminals, and Great Britain the least, among European nations.

#### CONTRIBUTION TO THE MEDICO-LEGAL STUDY OF FOOTPRINTS.

MASSON (*Annal. d'hygiène publique*, ser. 3, tome xvi. pp. 336-345, 1886) gives the results of an investigation of a case of murder in which the footprints of the assassin were of importance. A woman was found murdered in an isolated house in the neighborhood of Constantine. On the floor of her chamber were observed seven blood-stained imprints of a naked foot, and that the right foot. Seven persons were suspected of the murder, and the footprints had therefore to be compared with the right feet of all of them. The presumption was that all the footprints were those of the foot of one individual.

The author regrets the meagre instruction on footprints in medico-legal text-books. Causse's well-known method of measuring footprints he did not find to be of much service in this case. The author divides the investigation of a footprint into three distinct operations: (1) the taking of the footprint; (2) its measurement; (3) the attentive study of its particular qualities or peculiarities, which give to each footprint a special physiognomy. In order to take the footprint of a suspected person, he is asked to step on some defibrinated blood, or a gummy solution of fuchsine, and afterward to stand or walk on a piece of stout paper, in order to obtain a print under both conditions. The prints are then measured by drawing a straight line along the inner edge of the print, touching the heel and ball of the great toe. Then another line, parallel to this, is drawn along the outer side of the print, and touching it. These lines are joined by three lines parallel to one another, but at right angles to the first lines. One of these lines touches the point of the great toe; another touches the hinder part of the heel; and a third passes across the foot immediately behind the ball of the great toe. The foot is thus enclosed in a rectangle, representing the greatest length and breadth of the footprint. It is important to note the distance between the back of the heel and the front of the print of the ball of the great toe. This measurement is less variable than the total length of the footprint. The maximal distance of the inner edge of the footprint from the inner tangential line is also to be measured, as an index of the height of the plantar arch. A line is to be drawn touching the points of the impressions of the second and fourth toes, and the height of the angle which this line, when extended, forms with the inner tangential line is to be noted. It varies much in different individuals.

Masson carefully studied the variations in the above measurements, as seen



in different prints of the same foot. He found in twelve subjects that the chief variations were as follows: 9 to 23 millimetres ( $\frac{3}{10}$  to  $\frac{9}{10}$  inch) in the length of the footprint; 0 to 8 millimetres ( $\frac{3}{10}$  inch) in its maximal breadth; 0 to 5 millimetres ( $\frac{1}{10}$  inch) in the measurement corresponding to the plantar arch; and 0 to 21 millimetres ( $\frac{8}{10}$  inch) in the height of the angle of the toes. The extremes of the variations are met with in the prints from the foot standing, and those from the foot walking or running. He found that an added weight of forty pounds does not sensibly alter the footprint. In studying the physiognomy of the footprint, attention is to be paid to the marks of the toes, and especially to that of the great toe. In the latter, it is very important to distinguish the two parts of it; the anterior and larger corresponding to the mass of the toe, and the posterior and smaller (sometimes wanting) due to the flexor tendon. This smaller part varies much in different individuals. It is rarely absent from the print of the foot when walking, but may be so if standing. Applying these rules and considerations to the particular case in hand, Masson found a similarity between the footprints of blood on the floor of the chamber, and those of one of the suspected persons. Other circumstances afterward occurred to prove that this was the murderer.

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#### DIAGNOSIS OF DEATH BY HANGING.

COUTAGNE (*Arch. de l'anthropologie crim. et des Sciences pénales*, 15 Mai, 1886) believes, contrary to the view expressed by Jardieu, that the diagnosis of death does not depend essentially on the examination of the exterior of the body. The author especially insists on attention being paid to the internal lesions of the neck, which are generally more associated with judicial hanging than with suicidal hanging. Out of 24 autopsies of suicidal cases which he made, only 5 gave negative or doubtful results as regards the internal appearance of the neck. In 17 cases there was hemorrhage into the cellular tissue or into the muscles; in 10 cases there was rupture of the muscles; in 8 cases fracture of the hyoid bone; and in 8 cases fracture of the hyoid cartilage. He insists on the importance of examining the soft parts at the back of the neck. The lungs of hanged persons present some special characters, which Coutagne describes under the name of *carmine œdema*, and believes them to be dependent on an affection of the pneumogastric nerves.

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#### THE MEDICO-LEGAL SIGNIFICANCE OF THE BIPERFORATE HYMEN.

PROF. DEMANGE, of Nancy, reports two cases of biperforate hymen, and both in married women; the one a young widow after six years of married life without children, the other a wife advanced in pregnancy. In the former case a fibrous band passed antero-posteriorly dividing the vagina into lateral halves; in the latter the band passed transversely dividing the vagina into an anterior and into a posterior part. Demange felt satisfied that at least in the former of the cases the biperforate hymen was not the result of imperfect rupture during attempted coitus. He therefore agrees with Delens and Cornil, and differs from Tardieu, in believing that a biperforate hymen is generally a natural condition, and is not always, if even frequently, the result of attempted coitus.

## SPONTANEOUS CLOSURE OF THE EYELIDS AFTER DEATH.

Incited to the investigation by the paper of Galezowski on "The State of the Eyelids after Death," read before the Medico-Legal Congress in 1878, DR. VALUDE has made a large number of observations on this subject (*Annal. d'hygiène publ.* ser. 3, t. xvii. pp. 168-172). The main question which he endeavored to answer was, At what time after death do the eyelids close spontaneously? His observations extended over one hundred bodies. He found that during the first twenty-four hours after death the eyes were completely closed in 7 of the cadavers. In 12 of these one eye was closed and the other was open. In 15 both eyes were widely open. In 66 the eyes were moderately open, or half closed. He never observed the eyes open spontaneously after they were closed, even though he observed the body for two or three days. In 50 cases, where the eyes were observed to be fully open or half open immediately after death, at a second inspection, some hours later, the eyes were found to have remained in the same condition in 21 of these, while in 23 the eyes had slightly closed. Only in one case was a half-open eye found next day to be widely open. This he considers quite exceptional, and attributes it to the probable interference of the physician who made the autopsy. He further states that if the eyelids had not begun to close before the expiration of forty-eight hours from death, they seldom closed during the two following days.

The author concludes (1) that in 10 per cent. of subjects the eyelids are closed at death; (2) that in 90 per cent. the eyelids are open or half open; (3) that in about 42 per cent. of the latter the eyelids do not change, while in 46 per cent. more or less complete closure gradually occurs. He believes it to be possible, from inspection of the eyelids, to say whether they had closed spontaneously or whether they have been closed by the hand of an assistant. A whitish mark of the finger is, in the latter case, left on the upper eyelid, which is difficult to describe but fairly easy to recognize.

## CICATRICES OF LEECH BITES.

DR. CASTRO, of Italy, states (*Annal. d'hygiène publ.*, ser. 3, t. xvii. pp. 48-50) that he recently had occasion to inquire into the presence of scars as the result of leech bites. He made thirty-seven experiments on different individuals, with the result that in several cases it was impossible to discover a scar by the naked eye. But in such cases the scar became evident after rubbing the skin with tincture of mustard, which reddens the skin surrounding the scar, leaving the scar white.

## COCAINOMANIA.

ERLENMEYER (*Deutsche Mediz. Zeitung*, 1886) presents us with a study of this new disease, analogous to morphiomania, and reports a large number of cases in which patients have had recourse to large doses of cocaine with the object of avoiding the morphine habit. The results of immoderate use of cocaine consist in symptoms of vascular paralysis, quick pulse, profuse sweatings, disturbed respiration, and syncope. Erlenmeyer points out the dangers to which such persons are subject if required to be anesthetized by chloroform.

There is progressive emaciation, as in the case of morphiomania, the weight being lost to the extent of twenty or thirty per cent. The complexion becomes cadaveric, the eyes hollow, and the muscles flabby. Sleeplessness is a marked symptom. At an advanced stage psychical derangements manifest themselves, more especially of the nature of delusions as to persecution. Short of this there may be hallucinations of sight, with great intellectual depression, and with loss of memory. In some there is great prolixity in speech and in writing. Some of Erlenmeyer's patients had to be confined in a lunatic asylum. Erlenmeyer considers the prognosis of morphiomania to be very grave if it is associated with cocainomania.

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#### ANALOGY BETWEEN DUAL INSANITY AND DUAL SUICIDE.

CHPOLIANSKI (*Thèse de Paris*, 1885) points out the following analysis between dual suicide and dual insanity:

##### *Dual Insanity.*

1. One subject is insane; he imposes his insanity on the other—*imposed insanity*.

2. Two subjects become insane simultaneously under the influence of the same cause—*simultaneous insanity*.

3. Two subjects, equally predisposed, fall into the same fit of madness, but the one does so first, the other follows, compelled by the example of the first, and by predisposition—*communicated insanity*.

4. An insane subject changes his ideas for those of a more intelligent madman—*transformed madness*.

##### *Dual Suicide.*

1. One subject has the intention of suicide; he imposes it on the other—*imposed suicide*.

2. Two subjects intend suicide at the same time under the influence of the same cause—*simultaneous suicide*.

3. Two subjects have the idea of suicide, but the one commits suicide first; the other, fascinated by the idea or the act of the first, commits suicide at the same time, or soon afterward—*communicated suicide*.

4. An eccentric subject has his ideas directed to suicide under the influence of a notorious suicide, or in troublous times—*transformed suicide, or epidemic suicide*.

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#### THE PRESENCE OF FREE PHOSPHORIC ACID AS A PROOF OF POISONING BY SULPHURIC ACID.

PROFESSOR GARNIER, of Nancy, investigated a case of poisoning by sulphuric acid, in which, though indubitable signs of the mode of death existed in marks on the clothing, and in the black carbonized condition of the alimentary canal, as also in the presence of a trace of arsenic—a common impurity of sulphuric acid—in the canal, and although the carbonized organs had a strong acid reaction, yet on extraction with alcohol and ether no reaction of sulphuric acid was obtainable from the extract. From a further investigation of the subject, Prof. Garnier believes that in such a case the sulphuric acid has acted on the phosphates normally present in the tissues, and displaced the phosphoric acid, the latter acid then becoming the free acid found in the alimentary canal. He gives several experiments in support of this view.



## ARSENIC IN SOIL.

PROFESSORS GARNIER and SCHLAGDENHAUFFEN, of Nancy, recognizing the difficulty thrown in the way of the investigation of cases of arsenical poisoning by the ever-recurring suggestion that the arsenic found in the dead body has entered the body otherwise than in the form of poison, have made an experimental inquiry (*Annales d'hygiène publique*, ser. 3, t. xvii. pp. 28-37, 1887) into the subject. They divide the methods by which arsenic may enter the body in other form than poison into four groups: (1) the introduction of arsenic into the organism before death in the form of medicine, as Fowler's solution, in ordinary doses, or in the form of drugs containing a trace of arsenic as an impurity, as subnitrate of bismuth, sulphate of potash, etc.; (2) the introduction of arsenic, also before death, in foods and drinks, the organic matters from which these are prepared containing arsenic as an impurity—*e. g.*, sugar, confections, wine and beer; (3) the imbibition of arsenic by the dead body from the arsenical soil of the cemetery in which it is buried; (4) the imbibition of arsenic from the colored clothes in which the corpse may have been buried, or from the paint and metal mountings of the coffin.

The authors in their present investigation have confined themselves to the investigation of the third of these groups, and have made three sets of experiments, with the following results:

I. *Examination of soils naturally arsenical.* Arsenic is found disseminated in various soils in the Vosges in variable but often in considerable quantity, especially in red colored soils. The arsenic is present probably in the form of arseniate of iron. This salt is very slightly soluble in boiling water, but it is completely insoluble in water at the ordinary temperature of the soil. It cannot therefore be dissolved out by the percolating rain.

II. *Absorption of soluble arsenical compounds by non-arsenical soil in presence of water.* The soil chosen for this set of experiments was taken from the cemetery of Préville, Nancy. It was perfectly free from even a trace of arsenic. It is calcareous and of yellowish color, containing a considerable quantity of ferric oxide. A given quantity of the soil was mixed with twice its weight of distilled water, and to this was added a certain quantity of a weak solution of arsenious acid. A portion of the supernatant fluid was from time to time removed and tested for arsenic. It was found that after six or seven months the water contained no arsenic in solution. It had all become deposited in the form of arseniate of iron. Heat facilitated the disappearance of the arsenic.

III. *Diffusion of arsenic into a non-arsenical soil, in contact with soluble and insoluble compounds of arsenic.* Two ordinary graves were dug in the Préville Cemetery, side by side, one of which was afterward filled up and the other kept open. Four months later, cartridges made of white filtering paper, and containing each five grammes of arseniate of iron, arseniate of lime, or arseniate of potassium, were introduced by a boring process from the sides of the open grave into the surrounding soil and into the grave which had been filled up. At different periods subsequently the soil surrounding the cartridges were removed and examined for arsenic. No arsenic was at any time discovered except in the case of the soil surrounding the cartridges containing arseniate of lime, where a minute trace of arsenic was recognizable by Marsh's method.

The arseniate of potassium had disappeared, but had evidently been converted into insoluble compounds as soon as it came in contact with the surrounding soil. The authors conclude that the arsenical compounds met with in soil are not likely to diffuse themselves into the body of a buried person.

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MODE OF ACTION OF SULPHURETTED HYDROGEN AND ALKALINE  
SULPHIDES.

JULIUS POHL, in the *Archiv f. Experimentelle Pathologie u. Pharmakologie* (Bd. xxii. p. 1-25), gives the results of an investigation of the above subject, which he conducted in the pharmacological laboratory at Prague. His experiments were made on frogs and rabbits, and in two instances on dogs. Assuming that sulphuretted hydrogen, when it mixes with the blood, becomes converted into an alkaline sulphide, he employed a neutral solution of sulphide of sodium in nearly all his experiments, injecting it into the lymph-sac of the frog and the jugular vein of the rabbit and dog. The symptoms in the case of frogs, when a dose of 0.01 gramme (0.15 grain) was employed, were remarkably constant, and consisted of narcosis, central motor paralysis, slowing of the heart, with general enfeeblement of the cardiac muscle, ending with stopping of the heart in diastole. Fibrillar twitchings of the muscles were also observed. Death occurred in one and a half to two and a half hours, when a large dose was injected; in six or more hours when a smaller dose was given. In some cases rigidity of the muscles was observed. The poisonous symptoms in rabbits were not so constant as in frogs. In almost every case violent convulsions were present, with deep, labored breathing, plaintive cries, and slight tremors of the muscles. The convulsions were proved to be of cerebral origin. In the few cases in which convulsions were absent, a general and gradually increasing paralysis of the muscles was observed, with increased frequency of the respirations, and general exhaustion, ending in death. The lethal dose of the sulphide injected into the vein was about one and a half to two grains for an adult rabbit (about one-twentieth of a grain for each pound). Such a dose proves fatal in about an hour. The blood, though dark in color, contained oxy-hæmoglobin, and no sulph-hæmoglobin. In a few cases the hæmoglobin was reduced. The blood pressure rapidly sank, even after very small injections. This was probably due to the action of the sulphide on the vasomotor centres.

In order to ascertain whether the toxic action of the sulphide was due to its oxidized products, experiments were made with sulphite and hyposulphite of sodium, but although much larger doses than those of the sulphide were injected, no effect was observed on the blood pressure or otherwise. The toxic action, was, therefore, not due to oxidized products, nor was it caused by the sulphide abstracting oxygen from the blood; for the symptoms were not those of asphyxia, nor were similar symptoms observed when strong reducing substances were injected into the blood, such as hyposulphite of sodium, hypophosphite of sodium, phosphite of sodium, aldehyde, acetone, pyrogallol, etc. Some experiments were made by digesting the sulphide with defibrinated blood, and then injecting it into the jugular vein. A lethal result was still obtained, but the symptoms were somewhat different from those of the pure sulphide. The well-marked action on the blood pressure

was wanting. The author is, therefore, of opinion that the toxicity of the sulphide is due to its own action on the tissues, and not to the action of oxidized products or other transformations of it.

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## PUBLIC HEALTH.

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UNDER THE CHARGE OF

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### VACCINATION IN RUSSIA.

DR. UCKE gives an interesting account of the present condition of vaccination in Russia. The benefits of vaccination, he says, are only now beginning to be realized by the peasants in Russia. As early as 1811 the Emperor ordered that all medical men should vaccinate; and that peasants, chosen from certain districts, should be educated in this particular at the cost of the community, and sent into the provinces to vaccinate. Annual reports were sent to the authorities, but it was soon shown that vaccination was not producing any effect on the smallpox epidemics which decimated the country. At first it was believed to be the lymph; but even though animal lymph was employed, the result was the same. It was then thought necessary that some control should be exercised over the vaccinators, and accordingly this work was added to that already occupying the medical inspector of each province. This again failed, and it was easily explained. In 63 provinces, each having an area of 1500 square miles, 5000 villages, and about 80,000 children, there was but one inspector, and he could only vaccinate at such times as the peasants were not occupied in cultivating their land—*i. e.*, in the winter time, an impossibility with such a climate as that possessed by Russia. Thus vaccination ceased to be enforced almost until 1881, when local self-government having been given to thirty-four provinces, it was determined to appoint a commission to consider the question of vaccination. The territory which it was thus proposed to deal with consisted of the whole of the central provinces of European Russia, with the exception of Poland, the Baltic Provinces, the country of the Cossacks, and the provinces of Archangel, Astrachan, and Orenburg, and it has an area of 51,444 square miles, about 53,000,000 of population, and probably 2,710,000 children amongst them. These 34 provinces are divided into 360 districts; each of these manages its affairs for itself, and up to 1864 there was only one hospital of twenty beds in each district, and a peasant vaccinator in each village. These hospitals were somewhat improved after this date, and the vaccination was left to dressers, instead of to the peasants; but there was no control over the medical inspectors, who, in some places, left everything to the dressers, in others allowed people to come to them, and in others sought them out in their own homes. The vaccination



report for 1882 stated that at least one-third of the children were unvaccinated, and probably that was not stating the whole truth.

The Commission was occupied first with the question of the production of lymph, then with vaccinators, and thirdly with arranging the plan by which vaccinations were to take place regularly, and how systematic control could be exercised over all vaccinations.

After but a short discussion, it was decided to use animal lymph on account of the prevalence of syphilis in Russian villages, and the fear that arm-to-arm vaccination would aid in spreading the disease. As but few doctors and dressers could maintain a supply of animal lymph, it was determined to keep up a central station, where vaccination could be efficiently taught and lymph obtained for distribution.

Hitherto, also in Russia, owing to the distances to be traversed, and the scarcity of medical men, vaccination was left to "dressers," and this the Commission considered must be continued, only that a medical man should control each of these people, and ascertain that his work was properly performed, and measures should also be taken to have them better instructed.

The system thus designed is for the priests in every district to send at a fixed period a list of all the children born during the past year. A list of the number of villages is sent to a dresser, with the dates when he is expected to visit. Upon his arrival at the first village he vaccinates a calf, and then goes to the next village, leaving directions for the management of the first calf, there he does the same, and also on the third day. The fourth day he returns to the first village, takes lymph, vaccinates the children, and continues his journey, so that in six days he has vaccinated in three villages, and has also obtained lymph sufficient for the next villages. In every village he leaves a report of whom he has vaccinated. As soon after as the pustules might be considered to be developed, the doctor arrives with two dressers; he is provided with lymph, in case of failure of those previously operated upon, and thus he examines and journeys through all the villages previously vaccinated by the dresser. The work is so arranged that only twenty-four days in the month are counted upon, because of possible hindrances, and only during nine months of the year, because of the work in the fields during the other three months. The number of medical men and dressers varies according to the size of the district and number of inhabitants to each mile. When the expedition is over, the lists of those vaccinated are written up and sent in to the authorities.

Thus it will be seen that the ambulatory system of medical attendance will be the most useful for a country like Russia, the only danger to be guarded against is the scarcity of medical men, not less than one for every hundred villages being necessary.

Besides, in journeying every year through the districts, the doctors will learn the habits, customs, and diseases of the inhabitants, they will have leisure to prescribe for and visit their patients, and the dressers will be useful in visiting patients and preparing medicines. Every medical man is to be provided with a medico-topographical list of questions, in order that he may obtain information from all the villages, and that which he fails to obtain one year may be asked for the following, until a perfect history of all districts can be collected.

What results this new vaccination legislation will produce can only be seen after many years of work.—*Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege*, Bd. xviii. Heft 3, 1886.

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#### INFLUENCE OF SMALLPOX HOSPITALS.

The Local Government Board of England have recently issued the report of their medical officer, DR. GEORGE BUCHANAN, F.R.S., which contains a *résumé* of the evidence which has been adduced as to the influence of smallpox hospitals situated in London. Everyone of the five hospitals under the control of the Metropolitan Asylums Board, and also two others under different management, have given rise to smallpox in their neighborhood. The influence of the hospital at Fulham had been especially investigated by the Board's medical inspector, Mr. W. H. Power, and Dr. Buchanan now states that the whole of the experiences on record concerning the districts of London which are in special relations with smallpox hospitals, combine to form a very strong corroboration of the view of the Commission of 1881, that in the metropolis all smallpox hospitals share the disastrous ability of the Fulham hospital to spread smallpox by some means or other over the neighborhoods around them. This ability is now proved to extend to the distance of at least a mile, and to be independent of lines of human communication. It has now been shown to be exerted when the number of acute cases in a hospital has been restricted to twenty or thirty, and it was on one occasion exerted when only five acute cases were in the hospital together. It has not been extinguished, as Mr. Power's recent researches and the reports of health officers show, by the regulation of methods of transit, or by the removal of opportunities for personal communication with patients in the hospital.

It is to this influence of hospitals in maintaining smallpox over large areas of the metropolis, that must needs be ascribed a measure of that excess which has recently become conspicuous in the smallpox death-rate of London as compared with that of the provinces. This changed attitude of London toward the provinces, dating from the time when the former, and not the latter, became plentifully supplied with hospitals for smallpox, deserves especial consideration by any whose first thought is for the aggregate metropolis. For those whose concern is with the particular sections of London the facts will suffice that the five intra-urban smallpox hospitals in London have excess of smallpox around them, and that in the case of the hospital which has been especially studied (Fulham), this excess has amounted (during such portions of ten years as have seen the hospital at work, but not during other portions of the ten years when it was shut) to a threefold incidence of smallpox upon the three nearest square miles as compared with the incidence on the remainders of circumjacent districts. Dr. Buchanan therefore submits that the time has now come when the other means recommended by the Commission for "reducing the chance of spreading infection" ought to be tried.

The volume also contains, in appendix, a detailed memorandum on "Further Observation (1884-85) of the Influence of Fulham Smallpox Hospital on the Neighborhood Surrounding It," by MR. W. H. POWERS. The memorandum shows that when circles are drawn round the hospital having respectively a

quarter mile, half mile, three-quarter mile, and one mile radius, there has been the greatest incidence of smallpox upon that nearest to the hospital, and a less incidence on every successive ring in proportion as it is distant from the hospital; that this is equally true for each of the segments produced by dividing the area round the hospital by lines running from north to south and from east to west, and is further true when these lines are drawn from northwest to southeast, and from northeast to southwest. It should be noted that during the period when the hospital had this influence, every practical means had been taken for limiting the number of communications between the hospital and the outside world, and for rendering any danger to outsiders from such communications infinitesimal; an excellent ambulance service has been provided; and the number of sick in the hospital at any one time has been kept down even below the limit which the Hospital Commission regarded as permissible.

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#### ON THE ETIOLOGY OF FOOT AND MOUTH DISEASE.

A valuable paper on this subject is communicated by DR. E. KLEIN, F.R.S., to the same volume. He began his investigation by the examination of the organisms found in the tissue of the vesicle of the foot of the sheep. Two kinds of organisms were found in the diseased tissue: (*a*) bacilli of the size of tubercle bacilli, these stained in fuchsin after Gram's method, resembled the bacilli described by Gottstein and others as occurring normally in sebum in between the epithelial cells of sebaceous glands; (*b*) small micrococci occurring singly as dumb-bells, and particularly as longer or shorter chains or streptococcus; their number was not, on the whole, very large, but they were present in all the sections; they occur in the cavities of the vesicles and amongst the superficial parts as well as amongst the cell infiltrations of the deeper parts of the corium. They are found less abundant in the vesicle stage, more abundant in the formed ulcers, most abundantly in the superficial exudation of the ulcer of the mouth.

Inoculation of tubes containing sterile nutritive gelatine, or sterile agar-agar meat extract peptone, with lymph taken from a vesicle, led to definite results. In one gelatine and one agar-agar tube the growth on microscopic examination proved a motile bacillus; this, as it increased in number, liquefied the gelatine, and formed a pellicle on the surface. In size and other characters it was comparable to a small species of *bacillus subtilis*. In another gelatine tube, and in two other agar-agar tubes, the growth had altogether different characters, its progress was extremely slow, and after sixteen days' exposure to 36° C., the growth consisted of small collections of translucent, round, flat droplets or granules placed closely side by side. From one of these agar-agar tubes subcultures were established in a series of tubes containing gelatine, agar-agar, serum, sterile milk, sterile broth, meat extract solution with peptone (1 per cent.), and sterile broth with peptone (1 per cent.).

In the ordinary fluid media there appears as soon as twenty-four hours after incubation at 35° C. a very slight and uniform turbidity, which increases during the next few days; at the end of a week the growth has reached its maximum, but the turbidity is not at any time very great; before this point



is reached some growth begins to settle down as a white powdery mass, and after ten or twelve days or so the fluid has become quite clear, the whole having settled down. In sterilized milk it proceeds more slowly. A very remarkable difference exists between cultures in milk and in other fluid media; the growth in milk remains alive even after lapse of several months, in other fluid media, kept for three, four, or more weeks, the growth apparently becomes void of life. Microscopic examinations made of the growth from fluid media show it to consist of dumb-bell micrococci, diplococci, but chiefly of chains, streptococci, composed of 4, 6, 8, 12, 16, or more elements serially arranged.

Sheep, pigs, and guinea-pigs, inoculated with the streptococcus, did not suffer any noticeable illness; injection of a comparatively large quantity of the streptococcus into the cavity of the trachea in the case of two sheep and three calves failed to induce in these animals foot and mouth disease, but feeding four sheep with cultures of streptococcus induced in two of them the typical disease on the feet, a third animal showing lameness without other evidence of having contracted the malady; while the fourth remained well. On the other hand, certain guinea-pigs fed with the same streptococcus did not suffer from foot and mouth disease, but three of them died with disease of the stomach, which seemingly was of like nature in all cases. In two sheep the feeding of the streptococcus had to be repeated three times before one became infected. The symptoms of foot and mouth disease were well marked, and from the vesicle upon the foot of one of the sheep lymph was taken and used for the inoculation of culture tubes, each of which showed after a few days the characteristic growth of the streptococcus. It is noteworthy that five sheep previously inoculated did not suffer from foot and mouth disease when subsequently fed with the streptococcus, their immunity being in all probability due to their having been rendered refractory by the previous subcutaneous inoculation.

Dr. Klein adds, if a previous subcutaneous inoculation with the virus, though it does not effect any conspicuous disturbance of the general health, renders the animals experimented on thenceforward insusceptible to foot and mouth disease, a means would have been found to protect some animals at least against the virulent form of this disorder; but for a completely satisfactory settlement of the question, cattle as well as sheep require to be experimented on, since cattle are the most susceptible of animals as regards foot and mouth disease.

#### EPIDEMIC OF ENTERIC FEVER AT PIERREFONDS.

Recently, MONS. BROUARDEL brought before the Académie des Sciences a report on the prevalence of enteric fever at Pierrefonds. He stated that during August and September of last year (1886) 23 persons inhabited three houses adjoining each other, of these, 20 were attacked with fever, and 4 died, 8 were seriously ill, while several hardly suffered at all. The three who were not attacked had only resided in the locality a short time. Previously, in July, one person had been seized with illness after occupying one of the houses, and from 1874 to 1883 this group of houses was five times visited by

enteric fever. The street where these houses are situated lies at the foot of a hill, and the drinking water is obtained from a bed of clay covered by a layer of porous sand, about two to three feet deep, and on which are built these houses. In order to procure the water, holes in the form of wells were dug to the depth of 2 to 3 feet. These wells were only distant 9 to 20 feet from leaking cesspools, some of which had not been emptied for 30 years; besides which, the rain-water from the roofs was conducted direct into these cesspools, so that after heavy showers they overflowed, and saturated the surrounding soil with excremental matter. But in order to demonstrate more clearly that the water was responsible for the outbreak of disease, samples were taken from different wells, and examined by MM. Chantemesse and Widal, of the Bacteriological Laboratory in Paris, who reported that they had found bacilli resembling those which Eberth, Gaffky, and others considered to be the enteric fever bacillus, and these were found alive one month after the outbreak. The spleen of one of the patients was punctured, and blood from it also produced colonies of bacilli similar to those in the water. The water from the wells was also chemically analyzed, and that which came from the house where the bacilli were most numerous, contained least evidence of pollution, there being only 8 to 9 milligrammes of organic matter in a litre.

M. Brouardel's conclusions were that the earth does not destroy the germs of enteric fever; that they existed more than a month in the water of one of the wells at Pierrefonds; he states, however, that organic matter may be entirely destroyed if it comes in contact with any alkali.—*Journal de Hygiène*, No. 544, p. 93.

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#### TREATMENT OF SEWAGE.

MR. CRUMP and MR. DIBDIN read papers on the treatment of sewage at a meeting of the Institution of Civil Engineers in London, in which the former pointed out that filter presses afford a ready solution to the question of the disposal of the sloppy mass of putrescent mud daily produced in sewage precipitation works, and that a practically inodorous manure might be obtained, more valuable for crops of hay, potatoes, Swedish turnips, etc., than any farmyard manure. Mr. Dibdin, however, in his paper, though considering that sewage sludge presses are useful in converting the material into a portable form, did not believe that they would ever be really successful except for small quantities; the cost, also, is an almost insuperable obstacle. He believed the furnace, rather than the farm, will be found the most suitable way of disposing of unwholesome matter. In some places, where the quantity is small, it can be mixed with freshly slacked lime, and then run out on to porous beds, where after a few days, it will be found hard enough to cut with a spade and remove; or, as in Southampton, where dry road sweepings are mixed with semi-liquid sludge, and made suitable for the use of the farmer. But with regard to London, the only plan that seemed likely to succeed would be to carry the sludge out to sea, no expense would be incurred in pressing; the sludge need not be visible at all, it could be precipitated in covered tanks, pumped into vessels, and discharged under water, far from land,

in the most cleanly and efficient manner. The possible objections to this course were the waste of manure, which, however, is almost proved to be of little value, the nuisance on the coast, which could hardly be created if the system was carried out with care, and the difficulty arising from fogs and bad weather, which could not be considered a real objection. This plan, he acknowledged, though it might be suitable for London, need not be regarded as the only one for other towns, the recent Royal Commission having recommended various methods, such as the application of sludge to the raising of low lands, burning, or digging into the land, the last process being that adopted in Birmingham, where the soil is mostly gravel, and suitable for the purpose. Chemical precipitation is powerless to do more than remove a certain proportion of the oxidizable organic matter in sewage, and Mr. Dibdin pointed out that sulphate of iron used in conjunction with lime, could perform more than twice as much work as alumina and lime; he also stated that the system of filtration as an alternative to precipitation, is a failure, owing to the expense, the choking of the filters, the frequent cleansing, and heavy manual labor required.—*Sanitary Record*, vol. viii. part 94.

There is now in use at Walthamstow, Essex, a well contrived machine, the invention of Mr. Astrop, for extracting water from sludge. The sludge is first received into a large vat, in which are two hollow perforated metal cylinders, covered with fine wire gauze, which is kept clean by the cylinders constantly revolving against brushes; a partial vacuum is created in these cylinders by pumping, and about 60 per cent. of the moisture is extracted, the sludge then passes by a sluice-valve on to an endless web of travelling wire gauze of the width of the machine, and having the same sized mesh as the cylinders. The web is carried on rollers, and passes beneath other rollers, and also over one of Körting's exhausters, by which 10 per cent. of the moisture is removed. It next passes between rollers provided with scrapers, and then falls into a hopper, whence it is conveyed into a disintegrating cage on the lower floor; in this cage it loses more of its fluid by being exposed to a blast of warm air, and thus is converted into a powder, which contains but 5 per cent of its original moisture. In this form it falls through the meshes of the disintegrator on to an Archimedean screw by which it is conveyed to a distance and falls into bags.—*Lancet*, 1887, vol. i. No. 11, page 287.



# University of the City of New York.

## MEDICAL DEPARTMENT.

410 East Twenty-Sixth Street, opposite Bellevue Hospital, New York City.

### FORTY-SEVENTH SESSION, 1887-88.

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REV. HENRY M. McCracken, D.D., Vice-Chancellor.	FANEUIL D. WEISSE, M.D., Professor of Practical and Surgical Anatomy; Surgeon to Workhouse Hospital, B. I.
CHARLES INSLEE PARDEE, M.D., Dean of the Faculty; Professor of Otolgoy.	HENRY G. PIFFARD, M.D., Clinical Professor of Dermatology; Consulting Surgeon to Charity Hospital.
J. W. S. ARNOLD, M.D., Professor Emeritus of Physiology and Histology.	F. R. S. DRAKE, M.D., Clinical Professor of Medicine; Physician to Bellevue Hospital.
ALFRED L. LOOMIS, M.D., LL.D., Professor of Pathology and Practice of Medicine; Physician to Bellevue Hospital.	JOSEPH E. WINTERS, M.D., Clinical Professor of Diseases of Children.
WILLIAM H. THOMSON, M.D., LL.D., Professor of Materia Medica and Therapeutics; Diseases of the Nervous System; Physician to Bellevue Hospital.	PRINCE A. MORROW, M.D., Clinical Professor of Venereal Diseases; Surgeon to Charity Hospital.
J. WILLISTON WRIGHT, M.D., Professor of Surgery; Surgeon to Bellevue Hospital.	WILLIAM C. JARVIS, M.D., Clinical Professor of Laryngology.
WM. MECKLENBURG POLK, M.D., Professor of Obstetrics and Diseases of Women and Children; Physician to Bellevue Hospital, and to Emergency Lying-in Hospital.	LAURENCE JOHNSON, M.D., Professor of Medical Botany; Visiting Physician to Randall's Island Hospital.
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WM. G. THOMPSON, M.D., Professor of Physiology.	S. C. BLAISDELL, M.D., Demonstrator of Anatomy.
STEPHEN SMITH, M.D., Professor of Clinical Surgery; Surgeon to Bellevue Hospital.	MAURICE N. MILLER, M.D., Director of the Histological Laboratory.
A. E. MACDONALD, LL.D., M.D., Professor of Medical Jurisprudence and Psychological Medicine; General Superintendent of the New York City Asylums for the Insane.	

THE PRELIMINARY SESSION will begin on Wednesday, September 21, 1887, and end October 4, 1887. It will be conducted on the same plan as the Regular Winter Session.

THE REGULAR WINTER SESSION will begin October 5, 1887, and end about March, 1888. The plan of Instruction consists of Didactic and Clinical Lectures, recitations, and laboratory work in all subjects in which it is practicable.

LABORATORIES AND SECTION TEACHING.—The complete remodelling of the College building, and the addition of the new "Loomis Laboratory" adjoining, will be completed for the opening of the session of 1887-88. They will afford greatly increased laboratory accommodations in the departments of Biology, Pathology, Physiology, Chemistry, and Physics. A new amphitheatre and a new lecture room have been provided, as well as adequate facilities for Section teaching, in which the material from the College Dispensary will be utilized.

Two to five Didactic Lectures and two or more Clinical Lectures will be given each day by members of the Faculty. In addition to the ordinary clinics, *special clinical instruction, without additional expense*, will be given to the candidates for graduation during the latter part of the Regular Session. For this purpose the candidates will be divided into sections of twenty-five members each. All who desire to avail themselves of this valuable privilege must give in their names to the Dean during the first week. At these special clinics students will have excellent opportunities to make and verify diagnoses, and watch the effects of treatment. They will be held in the Wards of the Hospitals and at the Public and College Dispensaries.

Each of the seven Professors of the Regular Faculty, or his assistant, will conduct a recitation on his subject one evening each week. Students are thus enabled to make up for lost lectures and prepare themselves properly for their final examinations without additional expense.

THE SPRING SESSION will begin about the middle of March and end the last week in May. The daily Clinics and Special Practical Courses will be the same as in the Winter Session, and there will be Lectures on Special Subjects by Members of the Faculty.

It is supplementary to the Regular Winter Session. Nine months of continued instruction are thus secured to all students of the University who desire a thorough course.

#### F E E S .

For course of Lectures . . . . .	\$140.00
Matriculation . . . . .	5.00
Demonstrator's Fee, including material for dissection . . . . .	10.00
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For further particulars and circulars address the Dean,

PROF. CHAS. INSLEE PARDEE, M.D.,

University Medical College, 410 East 26th St., New York City.

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# University of Pennsylvania

## DEPARTMENT OF MEDICINE.

*Thirty-sixth Street and Woodland Avenue, Philadelphia.*

**One Hundred and Twenty-second Annual Session, 1887-88.**

Students who have not received a collegiate degree, or who do not present the evidence of previous education referred to in the Catalogue, are required to pass a preliminary examination in English and Physics, for details of which see Catalogue.

Attendance is required upon three winter courses of graded instruction, seven months in duration, and consisting of didactic lectures, daily clinical lectures, and practical work in laboratories and hospitals.

A VOLUNTARY FOURTH YEAR, almost purely practical, has been established, for particulars of which see Catalogue.

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HENRY H. SMITH, M.D., Surgery, Emeritus.  
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HARRISON ALLEN, M.D., Physiology, Emeritus.  
JOSEPH LEIDY, M.D., LL.D., Anatomy.  
RICHARD A. F. PENROSE, M.D., LL.D., Obstetrics  
D. HAYES AGNEW, M.D., LL.D., Surgery and Clinical Surgery.  
WILLIAM PEPPER, M.D., LL.D., Theory and Practice of Medicine, and Clinical Medicine.  
WILLIAM GOODELL, M.D., Clinical Gynecology.  
JAMES TYSON, M.D., General Pathology and Morbid Anatomy.  
HORATIO C. WOOD, M.D., LL.D., Materia Medica, Pharmacy and General Therapeutics.

THEODORE G. WORMLEY, M.D., LL.D., Chemistry and Toxicology.  
JOHN ASHHURST, JR., M.D., Clinical Surgery.  
WILLIAM OSLER, M.D., Clinical Medicine.  
EDWARD T. REICHERT, M.D., Physiology.  
WILLIAM F. NORRIS, M.D., Ophthalmology.  
GEORGE STRAWBRIDGE, M.D., Clinical Professor of Diseases of the Ear.  
HORATIO C. WOOD, M.D., Nervous Diseases.  
LOUIS A. DUHRING, M.D., Dermatology.  
LOUIS STARR, M.D., Pediatrics.  
EDWARD T. BRUEN, M.D., Assistant Professor of Physical Diagnosis.  
JOHN J. REESE, M.D., Medical Jurisprudence and Toxicology.  
J. WM. WHITE, M.D., Genito-Urinary Diseases.  
N. ARCHER RANDOLPH, M.D., Hygiene.

### OTHER INSTRUCTORS.

ROLAND G. CURTIN, M.D., Lecturer on Physical Diagnosis.  
CHARLES K. MILLS, M.D., Lecturer on Mental Diseases.  
ADOLPH W. MILLER, M.D., Demonstrator of Practical Pharmacy and Lecturer on Materia Medica and Pharmacy.  
DE FORREST WILLARD, M.D., Lecturer on Orthopedic Surgery.  
JOHN MARSHALL, M.D., NAT. SC. D., Demonstrator of Practical Anatomy.  
J. WILLIAM WHITE, M.D., Demonstrator of Surgery.  
HARRY R. WHARTON, M.D., Instructor in Clinical Surgery.  
JOHN B. DEAYER, M.D., Demonstrator of Anatomy.  
HENRY F. FORMAD, M.D., Demonstrator of Pathology and Morbid Anatomy, and Lecturer on Experimental Pathology.  
GEORGE A. PIERSON, M.D., Demonstrator of Normal Histology.  
RICHARD H. HARTE, M.D., Demonstrator of Osteology.  
GEORGE E. DE SCHWEINITZ, M.D., Prosecutor to the Professor of Anatomy.  
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*The Lectures of the Winter Session of 1887-88 will begin on Monday, October 3d.*

*The Preliminary Course will begin on Monday, September 19th.*

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## OF THE

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Professor of Materia Medica, Therapeutics and  
Hygiene.

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Lecturer on Dermatology, HY. WM. BLANC, M.D.

Demonstrator of Anatomy, RUDOLPH MATAS, M.D.

Assistant Demonstrator of Anatomy, A. McSHANE, M.D.

The next annual session of this Department, now in the fifty-fourth year of its existence, will begin on Monday, October 17, 1887, and end on Saturday, March 24, 1888. The first four weeks of the term will be devoted exclusively to Clinical Medicine, Surgery, Obstetrics, and Gynecology, in the wards and amphitheatre of the Charity Hospital; to practical Chemistry in the Chemical Laboratory; and to practical Anatomy in the spacious and well-ventilated anatomical rooms of the University.

The means for practical instruction are unsurpassed in the United States, and special attention is called to the superior opportunities presented for

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The administrators of the Charity Hospital elect annually, by competitive examination in March, fourteen Resident Students, who are given board and lodging free of charge.

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Matriculation Ticket . . . . .	\$5 00	.....
General Ticket of all Professors . . . . .	140 00	\$140 00
Ticket of Demonstrator of Anatomy . . . . .	10 00	10 00
Diploma Fee (once only when graduated) . . . . .	.....	30 00
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# The Jefferson Medical College

## OF PHILADELPHIA.

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HENRY C. CHAPMAN, M.D.,  
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JOHN H. BRINTON, M.D.,  
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The Annual Announcement, giving full particulars, will be sent on application to

J. W. HOLLAND, M.D., *Dean*.

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## Bellevue Hospital Medical College,

CITY OF NEW YORK.

Sessions of 1887-88.

The REGULAR SESSION begins on Wednesday, September 21, 1887, and ends about the middle of March, 1888. During this Session, in addition to the regular didactic lectures, two or three hours are daily allotted to clinical instruction. Attendance upon at least two regular courses of lectures is required for graduation.

The SPRING SESSION consists of recitations, clinical lectures and exercises, and didactic lectures on special subjects. This Session begins about the middle of March and continues until the middle of June. During the Session, daily recitations in all the departments are held by a corps of Examiners appointed by the Faculty.

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(Continued from first page.)

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
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A Manual of Treatment by Massage and Methodical Muscle Exercise. By JOSEPH SCHREIBER, M.D., Member of K. K. Gesellschaft der Aerzte of Vienna. Translated, with the author's permission, by WALTER MENDELSON, M.D., of New York. Philadelphia : Lea Brothers & Co., 1887.

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Report on the Mortality and Vital Statistics of the United States as returned at the Tenth Census (June 1, 1880). By JOHN S. BILLINGS, Surgeon U. S. Army. Part II. Washington, 1886.

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## THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES.

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With the coming of 1888 *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES* will be published at the beginning of every month, instead of quarterly, as heretofore. This change, though simply told, is one of deep significance. To readers it means a trebled frequency of communication with the leading thinkers, workers, and discoverers among their colleagues; to contributors it means a threefold more rapid and a far wider dissemination of their thought; to *THE JOURNAL* it assures an ever broadening circle of influence; and lastly, to those engaged in the executive work it implies a vastly increased amount of labor. Such a change, however, is simply in accordance with the spirit of the age. Never before were so many earnest workers engaged in all the fields of medical research, nor at any previous time have well-merited honors so surely crowned unselfish labor in behalf of humanity. One potent cause of this state of things may be seen in the enormous mental stimulus afforded by the modern possibility of reducing medicine to an exact science by coördinating and tracing the causation and effect of hitherto isolated empirical facts, through the employment of instruments of precision. These immense strides have now become such matters of fact that it is hard to realize that they are all comprehended within the life of this Journal. Yet we have it from the pen of an eminent medical bibliographer that "from this file alone, were all other productions of the press for the last fifty years destroyed, it would be possible to reproduce the great majority of the real contributions of the world to medical science during that period." Such a record, though legitimately a subject for pride, is here only referred to as a pledge that *THE JOURNAL*, though crowned with honorable years and achievements, will enter upon

the development of its new and enlarged possibilities with the vigor of youth and the mature experience gained through two generations.

In the adoption of a monthly form certain changes are implied. Though the aggregate of space will be somewhat greater, and though a larger proportion will be devoted to Original Articles, it will be presented in smaller divisions, and therefore brevity will become a virtue ranking second solely to merit. It is but fair that every reader should find in each number something of interest to himself, and if necessary, lengthy articles of value may be divided among successive issues in order to attain this end. Of the remaining two departments that of Progress will undergo no change. It has proved itself of great value, and no advisable alteration has suggested itself after diligent consideration. To accommodate the increased amount of space allotted to Original Communications, the Reviews will be condensed, yet with the maintenance of that judicial spirit which has always looked alone to the interest of the profession.

In its new form THE JOURNAL will become more than ever the favorite medium for presenting articles requiring some elaboration, and in connection with the weekly MEDICAL NEWS, it will furnish all practitioners and specialists with a complete and well-digested knowledge of the real life of the science. Such is the confidence of the managers of THE JOURNAL that their enterprise will be appreciated, that they have decided to accompany the new departure with a notable reduction in the rate of subscription, details regarding which will be found in the advertising pages preceding this announcement.



THE  
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CONTUSION OF THE ABDOMEN, WITH RUPTURE OF THE  
INTESTINE.

BEING THE ESSENTIAL PART OF AN ESSAY AWARDED THE CARTWRIGHT  
PRIZE OF THE ALUMNI ASSOCIATION OF THE COLLEGE OF  
PHYSICIANS AND SURGEONS, OF NEW YORK.<sup>1</sup>

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THE operative treatment of traumatic peritonitis, and of the injuries which cause it, is a matter of such universal interest at present that these pages need no apology. By a series of 44 experiments upon dogs, the general subject of contusion of the abdomen with rupture of the intestine has been studied. By experiments upon the cadaver it has been sought to throw some light upon the still doubtful mechanics of rupture of the gut. An analysis of 116 cases of rupture of the intestine, and of 33 cases of contusion of the abdomen terminating in recovery, has been made, with especial attention to the symptoms of the first hours after the injury, in the hope of rendering an early diagnosis possible. Finally, an attempt has been made, in the light of the experimental and clinical experience thus far gained, to indicate the most promising methods of treatment.

I. EXPERIMENTS UPON DOGS.

The experiments on dogs were conducted upon the following plan:<sup>2</sup>  
The animals were put under the influence of ether, laid upon the back

<sup>1</sup> The original essay, containing a full account of all the experiments, and tables, with an analysis of the cases, and references to their source, has been deposited in the library of the New York Academy of Medicine.

<sup>2</sup> The experiments were performed at the Carnegie Laboratory in New York, and the author is indebted to Dr. G. B. Phelps and Dr. F. A. Manning for most valuable assistance in the operations.

on the floor, and a weight dropped upon the abdomen. The weights varied from six to twenty-one pounds; and the height of the fall from four to seven feet. The striking surfaces employed were as follows:

Surface A. The side of a cylinder fifteen inches long, and one and a half inches in diameter, the cylinder being dropped in a horizontal position, its long axis crossing the animal's spine at right angles.

Surface B. A convex, circular surface, about two and a half inches in diameter, the greatest height of the convexity being about half an inch. For most of these experiments, a common porcelain door-knob formed the striking surface.

Surface C. A rectangular piece of wood, five by two inches, the edges rounded off, leaving a flat surface in the middle, three by one inches. This was also dropped with its long axis crossing the spine at right angles.

After the blow had been inflicted, three courses were pursued. 1. The animal was allowed to recover from the ether and left to its fate. 2. Laparotomy was performed after an interval of twenty-four hours; or of only five hours. 3. Laparotomy was done at once—the most usual course.

The immediate symptoms produced by the blow were trifling. Shock appeared in about one-half the cases, but it was usually slight. It was present in three of the cases in which no injury was sustained, and was severe in one of these, so that it was no indication of the severity of the injury received. When severe, it was generally a sign of great hemorrhage, or was due to the fact that the animal was not entirely under the influence of the ether.

In ten cases no injury was produced—in three of these nothing further was done, the intention being to wait for symptoms; in the others laparotomy was performed at once for exploration.

In the dog the cæcum lies by the side of the last part of the ileum, deriving its blood supply from a branch of the mesenteric artery which runs in the cellular tissue between the two. In two cases the cæcum was separated from this attachment to the ileum, rupturing the branches of this vessel, the main trunk being left attached to the small intestine. This artery was of such large size that in one of these cases four ounces of blood were lost from it in the few minutes elapsing before the belly was opened. In both cases gangrene of the cæcum was inevitable, and that part was resected, both animals recovering.

Laceration of the mesentery, so severe as to deprive part of the intestine of its blood supply, occurred in thirteen cases, and was treated by immediate laparotomy, except in one case which died of hemorrhage half an hour after the injury. Four others died on the table of hemorrhage. An artificial anus was made three times and the intestine resected five times—but all died within twelve hours of hemorrhage and

shock, except one of the resection cases, which lived for forty-eight hours, dying of peritonitis from silk which was not aseptic. The unfortunate results of the cases of artificial anus led to frequent attempts at resection, although the animal was too feeble to warrant it, and death was caused by the shock and exhaustion due to the prolonged operation.

In addition to these cases of laceration of the mesentery necessitating resection, there was one case in which a large branch of the mesenteric artery was injured, with such a profuse hemorrhage that life was endangered. The vessel was secured by ligature, the collateral circulation of the corresponding part of the gut found sufficient, and the animal made a good recovery.

Contusion of the intestine severe enough to require treatment occurred in ten cases, including those cases in which the ecchymosis was so extensive as to threaten perforation of the gut, most of them being also accompanied by a laceration of some of the coats of the intestine. The usual form of this last injury was a small fissure in the peritoneal and muscular coats exposing the fibrous coat. It must be remembered that in the dog the submucous coat of the intestine is developed into a strong fibrous tissue resembling a thin aponeurosis, making the wall of the gut very much stronger than in man. Even if the fissure was small, the edges were so bruised and ragged that the fibrous coat, although itself uninjured, was deprived of all blood supply, except the minute vessels which lay in its own tissue, between it and the mucous membrane, or in the tissue of the latter. In injuries of this kind the mucous membrane was found entirely destroyed by the blow, or separated from the underlying fibrous coat by effusion of blood, so that there was no possibility of its capillaries supplying the latter with blood even if they are normally equal to the task—which seems doubtful.

In four cases the injured point was turned into the lumen of the gut and sutured, and three of these recovered, the fourth dying of intestinal obstruction, caused by a Z-shaped bend in the gut at the point of suture, held by firm adhesions. Six cases were treated by resection, of which two recovered. The others died—one of shock, two by yielding of the sutures at the point of resection, and one of peritonitis caused by silk which was not aseptic. Thus we have in this set of cases a total of five recoveries and five deaths.

One of the later experiments illustrated the necessity for these precautions in a very striking way.

In this case (a dog which had been already subjected to a resection experiment) the weight was dropped and laparotomy was performed five hours later. The intestine was found ruptured entirely across at a point in the duodenum, and a loop which had been adherent to the inner surface of the former abdominal wound had been forcibly separated from its adhesions, thus tearing off its peritoneal and the greater part of its muscular coat for a space of about one inch square, but not laying the fibrous coat entirely bare. The dog was



so feeble by the time that the ruptured point had been sutured, that it was determined to leave this doubtful place to nature—the rather because there had been no contusion at this point, the injury having been caused by a dragging and stripping off of the superficial parts, and there seemed good reason to suppose that the mucous membrane was intact, and that its vessels would suffice to supply the fibrous coat with blood. The dog died of shock about eight hours after the operation, and we found that the doubtful spot was black and completely gangrenous.

Rupture of the intestine was produced in eight cases, in two of which there were two ruptures. Of these ten ruptures of the gut, four extended completely across it, and two almost across. Of the rest, three were directed in the long axis of the gut, while only one was transverse—all four being situated on the free border. One of the two cases which extended almost across the gut involved all but the attached border, the other all but the free border—the latter a very rare form of the injury.

The mucous membrane was generally everted, but not in all cases—depending upon the amount of contusion which the edges of the opening had suffered. In some cases, in which laparotomy was done at once, the edges were found much less everted at first than they subsequently became, for the muscular contraction which causes the eversion occurs slowly, and the muscular tissue may have been partially paralyzed by the blow. This gives another proof of how little eversion of the mucous membrane is to be depended upon to prevent fecal extravasation. In the complete ruptures the ends were partly closed by muscular contraction. The same contraction caused wide gaping of the ruptures which were directed in the long axis of the gut.

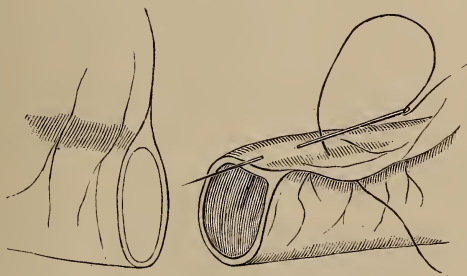
Rupture of the intestine was treated in one case by resection with suture of the gut five hours after the injury. The dog died of shock and beginning septicæmia and peritonitis, within twelve hours. It was treated by immediate laparotomy in four cases. One of these died from hemorrhage within one hour after the injury, there being a laceration of the mesentery also. Two were too severely injured to permit resection and suture, and an artificial anus was made. One of these died of shock; the other recovered from the operation but succumbed to purulent peritonitis starting from the abdominal wound. The remaining case had a rupture which admitted of suture, as it did not extend entirely across the gut, and recovered.

The most troublesome part of suture of the intestine in resection is the introduction of the stitches at the mesenteric border, on account of the difficulty of bringing the serous surfaces in contact at this point. The triangular interval between the two layers of the mesentery at its attachment to the gut cannot be much reduced by the lateral pressure of two Lembert sutures, placed one on each side of the mesentery in the usual way. A small raw surface, the cut edge of the mesentery, will always remain, communicating at one end with the interior of the gut,

and at the other with the peritoneal cavity. It occurred to me that if the mesentery could be folded down upon the outside of the intestine, and then turned in with the latter at the point of suture, this raw surface would be reduced to a minimum.

To secure this by sutures, they should be passed in the following manner: Let the cut end of intestine nearest the operator's right hand hang free from its mesentery. Pass the needle through the mesentery at a point one-third of an inch from the free edge of the mesentery and one-quarter of an inch from its attachment to the gut. Taking up the needle on the further side of the mesentery, make a Lembert stitch on the surface of the intestine on that side, entering the needle one-third of an inch from the cut edge of the gut and one-quarter of an inch from the attachment of the mesentery to the gut, and keeping it parallel with the mesenteric attachment, bring it out near the cut edge of the gut in the ordinary way (Fig. 1). Then pass the needle back again through

FIG. 1.



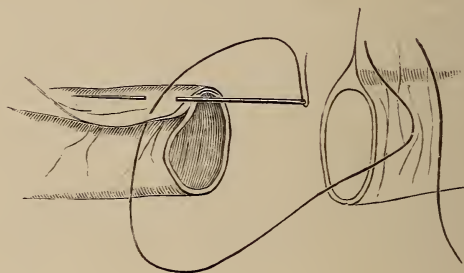
the mesentery at a point one-quarter of an inch from its attachment to the intestine, but near its cut edge, so that the needle will finish upon the same side of the mesentery as it started from. If the thread is now drawn tight, it will be seen that the mesentery is folded down upon the side of the gut by the thread.

Now hold up the other end of intestine by its mesentery, the edge directed toward the first, as it is intended to unite them. Pass the needle through the mesentery of this second end of gut near its cut edge and one-quarter of an inch from its attachment to the intestine. Taking up the needle on the further side of the mesentery, make a Lembert stitch on the surface of the intestine on that side, entering the needle near the cut edge of gut at a point one-quarter of an inch from the attachment of the mesentery, and bringing it out one-third of an inch from the cut edge of the gut and one-quarter of an inch from the mesenteric attachment (Fig. 2). The needle is then to be passed back again through the mesentery at a point one-quarter of an inch from its attachment to the intestine and one-third of an inch from its cut edge (Fig. 3).

The completed stitch is exactly the same on both ends of the gut, although the course of the needle on the second end was just the reverse of that taken on the first.

It will then be seen that the two Lembert sutures are on the same (further) side of the mesentery, and parallel to its attachment to the

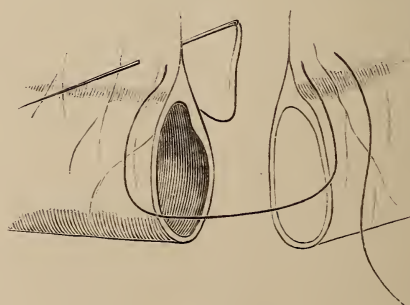
FIG. 2.



intestine. If the ends of the thread are drawn upon, it will be found that the mesentery of both ends of the gut is folded down upon the sides of the intestine. If they are drawn still tighter, the ends of the gut will be turned in (in the usual way with the Lembert suture), and carry the edges of the down-folded mesentery with them, and a knot can be made in the ordinary manner.

We have thus succeeded in disposing of the thickest part of the mesentery by turning it into the lumen of the intestine, just as the raw edges of the gut itself are turned in. At a distance of one-quarter of an

FIG. 3.



inch from the mesenteric attachment the loose cellular tissue which fills the triangular space between the layers of the mesentery close to the gut is much reduced in quantity, if not altogether absent; and when the mesentery has been turned down upon the side of the intestine as described above, this thin part of the mesentery is the part which will



find its way out of the seam when the ends of the gut are turned in. This is far less likely to interfere with prompt union than the comparatively broad surfaces brought together by the sutures as usually applied. This stitch is much more complicated in its description than in its application, although it cannot be denied that the latter is also difficult. But the much greater security which it affords has proven it to be well worth the additional trouble in the numerous cases in which it has been used.

Having applied this stitch, two Lembert sutures should be inserted close to it, one on each side. One of these has to pass through the place where the mesentery is folded over, making several thicknesses with considerable cellular tissue, and the needle must be made to pass a little deeper than usual in order to take up the muscular coat, otherwise it will tear out very easily.

The following conclusions are justified by the facts already presented:

1. Exploratory laparotomy can be performed without danger.
2. The most common causes of death after contusion of the abdomen, produced as described, are hemorrhage and shock; and the latter is greatly increased by a prolonged operation, such as resection of the intestine.
3. Some cases of internal hemorrhage, otherwise fatal, can be saved by prompt action.
4. Prompt action will save life in contusion, threatened gangrene, and even rupture of the intestine.
5. The danger is greatly increased by delay, as shown by the early occurrence of gangrene, the rapid failure and death of cases left without treatment, and the greatly impaired strength found in cases in which treatment was delayed.

## II. EXPERIMENTS UPON THE CADAVER.

There are two theories in regard to the mechanical causation of rupture of the intestine by contusion of the abdomen—that it is caused by a blow inflicted upon the gut distended with gas or with fluid contents; and that it is caused by the crushing of the gut, whether distended or empty, between the contusing body and some hard background, usually the spinal column. Longuet<sup>1</sup> dropped a weight upon the bodies of three cadavers, alternately over the spine and to one side of it. In order to gain additional evidence, I have repeated his experiments upon four cadavers.<sup>2</sup>

Including both series of experiments, we obtain a total of five blows delivered in the middle line, causing in three a rupture of the gut, and

<sup>1</sup> Bull. Soc. Anat., Paris, 1875, 1. p. 799.

<sup>2</sup> The author is indebted to Dr. George L. Peabody, Pathologist to the New York Hospital, for the opportunity to experiment upon the cadaver.

in the other two a laceration of the mesentery. On the other hand, of nine blows delivered laterally, in six cases there was no injury; and in the three in which injury was caused, the weight touched the side of the spine in its fall, but in none of these three was a rupture of the gut produced. Thus, in a total of fourteen blows, the eight which struck the spine produced injuries, and the six which did not touch it were harmless.

This evidence proves conclusively that distention of the intestine is not necessary for rupture, but that a contact between the contusing body and some solid resistance, such as would be furnished by the spine or the pelvic bones, is indispensable to produce rupture in the empty gut. But there is still some footing left for the old theory. Can a distended loop of gut be ruptured when it lies upon one side of the spine, where we have proven the collapsed gut to be safe from injury? To determine this point, the following experiments were performed:

An incision about three inches long was made in the middle line of the belly, the lower end of the incision being placed at the pubes. One or more loops of gut were drawn out, inflated with air after isolation between two ligatures, returned to the belly, and placed either over the spine above the incision or upon one side of it, in the lumbar region. The incision was closed by suture, and the weight dropped directly over the prepared loops. This experiment was carried out upon five cadavers.

In this set of experiments, of four blows delivered upon loops lying in the middle line, in front of the vertebræ, rupture of the gut was produced twice, and rupture of its peritoneal coat in the other two cases, in one of which there was also produced a laceration of the mesentery. This last experiment shows how readily the inflated gut may escape rupture, for the descending weight could only have reached the mesentery by pushing aside the intestine, which lay in front of it. One of these experiments shows that the inflated gut may even prevent injury to other structures, for it is the only experiment of all performed by Longuet and myself in which a direct blow upon the spine failed to produce some injury, for rupture of the peritoneal coat can scarcely be considered an injury. We must, therefore, acknowledge that inflation of the gut does not increase the danger of rupture in loops lying against the spine, and may even diminish it.

On the other hand, of seven blows delivered upon loops placed at the side of the spine, in only three was no injury produced, while rupture of the gut occurred three times, and rupture of its peritoneal coat once.

We may conclude that—

1. In contusion of the abdomen the intestine is ruptured by being crushed between the contusing body and the bony parts—the vertebræ and pelvis. This injury is therefore not a true *rupture*, but a *contused and lacerated wound* of the gut.

2. Partial distention of the gut, especially if a large part of the intestine is distended, diminishes the danger of rupture. If great distention of an isolated loop ever occurred in life, it would increase the danger of rupture, even for a loop not in contact with bony parts.

3. The most exposed position for the gut is in contact with the bony parts—in front of the vertebræ, near the brim of the pelvis (when hernia is present), and near the crest of the ilium.

4. There are many chances in favor of escape of the intestine from injury in contusion of the abdomen—there may be no gut lying directly at the point where the blow is inflicted; the gut may be partially inflated with gas; or it may slip away from the pressure exercised by the blow. This fact is of great importance in its bearing upon the question of early performance of laparotomy for rupture of the intestine.

### III. CLINICAL.

**PATHOLOGY.**—116 cases of rupture of the intestine have been collected with the intention of studying the symptoms of the first six to twelve hours after the accident, only those cases in which these symptoms were described with sufficient fulness being accepted. A few exceptions were made to this rule in order to secure examples of rare symptoms, or of rare forms of injury, and thus the proportion of these unusual cases is greater than would be found in a consecutive series of cases, and due allowance must be made for this fact in certain points which will be hereafter pointed out.

The cause of the injury is described in 99 cases. The most common cause is the kick of a horse or man, numbering together 28 cases—twice as many as are due to any other cause. Next to this, and all nearly equal in the number of cases, are the run-over accidents (13 cases), the blows on the belly by heavy weights (16) and by light weights (13), and the falls upon projecting points (13). The so-called “buffer accidents” are comparatively rare (4 cases). It is evident that the great velocity and small area of striking surfaces are the elements which make a kick so dangerous.

The relative frequency of injury in different parts of the intestine is shown by the following: in 113 cases, the duodenum was injured 6 times, the jejunum 44, the ileum 38, other portions of the small intestine 21 times, and the large intestine only 4 times. This proportion indicates that the liability of the jejunum to injury is no greater than that of the ileum. The duodenum escapes on account of its sheltered position. In 43 cases the exact site of the rupture is given in the jejunum and ileum, and in 25 (58 per cent.) of these it lay in the first three feet of the jejunum, or in the last three feet of the ileum. In 12 cases (28 per cent.) the rupture was situated in the first eighteen inches of the jejunum, and in 6 (14 per cent.) in the last eighteen inches of the ileum. These facts bear



out the old theory that the danger of rupture is greatest in those parts of the intestine which are most fixed in their position in the abdomen, but the large intestine must be excepted on account of its sheltered position.

Of the entire 116 cases the rupture extended completely across the intestine in 20 cases, and almost across in 4. In 11 cases there were multiple ruptures, in 2 of these there were four ruptures, in 2 there were three, and in 3 two. In only two of the cases in which the rupture extended part-way across the intestine is it mentioned that the mesenteric border alone was involved. In only one case<sup>1</sup> was the rupture so situated as not to communicate with the peritoneal cavity, and then it lay on the posterior wall of the duodenum where it passes behind the mesentery.

The rupture varies from the size of a quill to one which will admit four fingers, but is most frequently about one inch in diameter. Is there any constant relation between the force of the blow and the extent of the rupture? A study of the twenty cases in which the rupture was complete, shows that the blow was severe in all but two. On the other hand, among the causes of the twenty-two cases in which the rupture was half an inch or less in extent, there are only three in which the blow appears to have been severe. These cases warrant the assertion that the amount of injury will be proportional to the violence of the blow, but that exceptions will not be infrequent. A small rupture, however, is almost as certain to prove fatal as a large one, so the question has very little practical importance. A striking instance of this is a case<sup>2</sup> in which the rupture was only one-third of an inch in diameter and yet death occurred in sixteen hours.

Eversion of the mucous membrane at the injured point is the rule, being mentioned as present in ten partial, and four complete ruptures, while it is noted as absent in only two cases. Jukes also records a case<sup>3</sup> in which there was an extensive lesion of the peritoneal coat, with a rupture of the bowel the size of a goose-quill, with no eversion of the mucous membrane—fecal extravasation and peritonitis were present and death had occurred forty hours after the accident. In one of our cases<sup>4</sup> the mucous membrane rolled out and the peritoneum turned in, the two covering the cut edge of the muscular coat.

Fecal extravasation is almost invariably present, but may be delayed, or even absent. It is recorded as present in seventy-three cases, but the presence of peritonitis in nearly all the rest makes it probable that it was present in them also, although peritonitis may possibly arise from other causes than fecal extravasation. In nine cases it is recorded as

<sup>1</sup> Gärtner: Vierteljahrsschrift f. prakt. Heilk., Prag, 1854, xlii p. 44.

<sup>2</sup> Annan: American Journal of the Medical Sciences, xxi. p. 530, 1837.

<sup>3</sup> Jukes: Med. Chir. Journ. and Rev., v. p. 269, 1818.

<sup>4</sup> Chavignez: Bull. Soc. Anat., Paris, 1839, xiv. p. 217.

absent. In some of these cases peritonitis was present, but they show that it is not impossible for fecal extravasation to be wanting. In two cases<sup>1</sup> of complete rupture, the open ends were so entirely closed by muscular contraction, prolapse of the mucous membrane, and rapidly formed adhesions, that the bowel was actually found to be distended above the injured point. In such a case it is easy to understand how fecal extravasation could be prevented—and, in fact, in one of these cases the onset of symptoms was delayed. This condition would be more likely to occur with complete ruptures than with partial—unless the latter were very small, just as hemorrhage is more severe when an artery is wounded in part of its circumference than when it has been entirely divided and the injured end is free to contract and retract. The phenomena observed in the experiments upon dogs as to the contraction of the intestinal muscle furnish excellent illustrations of this subject.

With rupture of the intestine were found in twelve cases contusions and other slight injuries of the gut. Contusion of the gut may lead to peritonitis even when not so severe as to cause gangrene and perforation, as has also been shown by Grawitz,<sup>2</sup> the diminished vitality of the tissues allowing microorganisms to penetrate them and set up inflammation in the adjacent peritoneum. Similar conditions are seen in practice, in the peritonitis accompanying intestinal obstruction, or following the reduction of a strangulated hernia.

The most frequent and important complication of rupture of the intestine is laceration or contusion of the mesentery. The hemorrhage from the ruptured gut is trifling unless the mesenteric border is involved, and even then it is not usually serious. But hemorrhage from laceration of the mesentery may cause death in a few minutes, and even slight injury to its vessels may deprive part of the intestine of its blood-supply, and cause gangrene, although the gut itself have escaped injury. There are four cases of contusion, and fifteen of laceration of the mesentery, complicating the cases of rupture of the intestine. Of the last set of cases all but three of the patients died within twenty-four hours, and in these three no mention is made as to the state of the circulation in the gut at the time of death. In some of those in which death occurred early, gangrene of portions of the gut was inevitable; and in a case in which laceration of the mesentery was the only injury, it was found that gangrene had already taken place at the time of death. The frequency and gravity of this complication of rupture of the intestine does not seem to be properly appreciated. It occurred in sixteen per cent. of the cases collected, and we have already seen how often it was produced in the experiments on dogs. Probably the smaller lacerations (competent,

<sup>1</sup> Partridge: *Trans. Path. Soc.*, London, 1860-1, xii. p. 109. Poland: *Med. Times and Gaz.*, ii. p. 443, 1868.

<sup>2</sup> *Charité-Annalen*, xi. Jahrg., p. 770, Berlin.

however, to produce gangrene) are frequently overlooked in the autopsies made in cases of contusion of the abdomen dying in the first twenty-four hours, and many such cases with symptoms of severe internal hemorrhage are allowed to pass without autopsy on a diagnosis of rupture of the liver or spleen, in which the real lesion is a laceration of the mesenteric vessels, with or without injury to the intestine.

**SYMPTOMS OF THE EARLY STAGE.**—The symptoms immediately following the injury are of the greatest importance, for the diagnosis must be made as soon as possible, if the treatment is to be successful.

These symptoms are shock, with or without loss of consciousness, restlessness, vomiting, retention of urine, absence of fecal passages, local pain and tenderness, and the physical signs afforded by examination of the abdomen. The condition of the pulse at this time will not need separate consideration, as it depends upon the amount of shock, and hemorrhage, and often does not assist even in a distinction between these. The temperature is of little value as a guide, although it is sometimes subnormal when the shock is great, and may rise as peritonitis develops.

The symptoms may all appear immediately upon receipt of the injury, or one or all may be delayed for some hours. Delay in the appearance of symptoms was present in ten cases, and some are so remarkable as to deserve a fuller account.

A boy,<sup>1</sup> thirteen years old, received a blow upon the abdomen from the pole of a churning machine, walked a mile with but little assistance, had great pain and vomited frequently and persistently, but the symptoms were "not at all marked." In twelve hours sudden collapse came on, and death followed one hour later. Autopsy showed a complete rupture of the duodenum.

A man,<sup>2</sup> nineteen years old, fell from his cart while drunk, and the wheel passed over his body. He was insensible from drink, and vomited the contents of his stomach, but there was no shock and no other symptoms. The next day he felt well, there was no tenderness in the abdomen, and the urine and stool were passed normally. He was allowed to walk about the ward of the hospital, and to eat three meals of bread, broth, and milk. Twenty-six hours after the accident, and half an hour after the last meal, sudden cramping pains in the abdomen came on, collapse followed, and death in one hour and a half. Autopsy showed a complete rupture of the jejunum.

A strumous girl,<sup>3</sup> eleven years old, in running up stairs, fell and struck her abdomen, at the level of the umbilicus, on the edge of a step. She cried a little, but walked up stairs, then vomited the contents of her stomach, fell asleep and slept half an hour. She seemed a little faint, and was kept in bed, but she felt well and had no pain. She slept well all that night. Twenty hours after the accident she walked down stairs, after which she felt slight pain in the abdomen for awhile, and there was some tenderness. Four hours later she ate a few mouthfuls of egg-pudding, the first food she had taken since the accident, vomited it, fell into collapse, and died at once. Autopsy showed a rupture of the jejunum extending for half of its circumference (the edges bruised, the mucous membrane appearing as if it had not been everted), fecal extravasation, and beginning peritonitis.

<sup>1</sup> London Medical Gazette, 1833, xii. p. 766.

<sup>2</sup> Walker : Lancet, 1881, ii. p. 637.

<sup>3</sup> Holland : British Medical Journal, 1873, i. p. 703.



The proportion of these cases to the entire number in the table is misleading, for such peculiar cases are much more likely to secure publication than those which run the ordinary course. The true proportion must be far less than one in eleven.

*Shock.* In 95 of the cases the presence or absence of shock is noted. Shock was present in 76 cases—80 per cent.; and absent in 19 cases—20 per cent. It is described as severe in 30 cases, and as slight in 16 cases.

*Consciousness.* Consciousness was retained at the time of the accident in 54 cases, was almost lost in 4 cases, and was lost in 11 cases. But four of the cases in which it was lost lived two, four, and seven days, and the symptom is altogether unreliable as an indication of the severity of the injury, and even of the degree of shock present.

*Restlessness.* Restlessness is not a common symptom. It is noted as present in the early stage in eight cases; while it appeared in one case after six hours, in one case after twelve hours, and in two cases on the third day. The last two cases do not properly belong here, but they are quoted to show that restlessness is not exclusively a symptom of internal hemorrhage. In these cases it is doubtless to be regarded as due to the peritonitis—perhaps merely as an unusual symptom of the accompanying fever. In two of the cases there was no hemorrhage, and in two it was slight, and yet this symptom was present from the first. In these cases restlessness must be regarded as part of the symptom-complex of shock.

*Vomiting.* Data as to this symptom in the early stage are given in 90 cases. Vomiting was present in 72 cases—80 per cent.; and absent in 18 cases—20 per cent. There was nausea in four of the cases in which there was no vomiting, and in most of them vomiting appeared as a symptom of the later stages. The vomiting was severe in one-third of the cases in which its presence was noted, and it is described as slight in only five cases. The vomiting may be continuous, or occur at long intervals, and in some cases it even ceased entirely for some time, returning later. The contents of the stomach were first expelled, and then bilious matter. In five cases blood was present (including two cases of dark brown vomit), in one in clots. The ruptures were situated in the duodenum, jejunum, ileum (two cases), and “small intestine,” showing that hæmatemesis does not indicate a rupture near the stomach. In two of these cases there was severe hemorrhage into the peritoneal cavity, and in one of them the stool was also bloody, complete rupture of the jejunum having occurred, and the blood probably finding its way into the peritoneal cavity, and into both ends of the bowel from an injured vessel on the edge of the wound. When life lasts for some time the vomiting may become fecal, but the study of this symptom must be deferred for the present.

*Constipation* will be seen to be the rule, but it must also be considered with the late symptoms, for the fact that no stool was passed in the first six hours would be of no clinical importance.

*Urinary symptoms.* These are important in excluding injury of the bladder and kidney. The character of the urine is unchanged in uncomplicated rupture of the intestine, yet there are two cases in which the urine was slightly bloody; the account of the autopsy not explaining this symptom, which must have been due to some slight contusion of the bladder or kidney. But the functions of the bladder are very frequently disturbed. Their condition is noted in 47 of the cases. Retention was present in 25 cases (one had stricture). Urination was difficult in 1 case, and normal in 17 cases—less than 50 per cent. Tenesmus was present in 4 cases.

The retention is, doubtless, to be looked upon as part of the condition of shock, but the tenesmus is not easy to explain. In one case there was severe hemorrhage into the belly, and this may have been the cause of the tenesmus. Suppression of urine occurred in one case—probably due to the severe shock present, from which the patient never reacted, although life lasted three or four days.

*Pain.* Pain in the abdomen is one of the first and most constant of the symptoms of rupture of the intestine, and it is usually severe. Pain was present in 104 cases—92 per cent.; and absent in 9 cases—8 per cent. It was severe in 74 cases—89 per cent.; and slight in 9 cases—11 per cent.

The pain may be burning or twisting, continuous or lacerating, but usually resembles the pain of colic. It may begin as a slight pain, and grow worse gradually or suddenly, or it may continue slight throughout. In some cases it ceased for a time, after longer or shorter duration. In nearly all the cases in which it was delayed, in common with the other symptoms, it appeared suddenly, and as the forerunner of speedy and fatal collapse. It is frequently so intense that morphine seems powerless to relieve it.

Pain was absent in the early stage in 9 cases, but developed later in 6 of these. One of the six was a man who was kicked by another upon an old hernia, and had no symptoms for six hours, and the delay was probably due to the fact that the extravasated fecal matter did not at once reach the general peritoneal cavity. There was no pain throughout the course of the case in two remarkable instances, which follow.

A boy,<sup>1</sup> six years of age, was crushed between a wagon and a fence. The only symptoms present were weakness, vomiting, and constipation. Death occurred in two and a half days. Autopsy showed a rupture extending entirely across the ileum, and peritonitis.

<sup>1</sup> Bentley: Pacific Medical and Surgical Journal, 1872, vi. p. 128.

A man,<sup>1</sup> thirty-six years old, suffering from general paralysis of the insane, fell while running away from an attendant, and the latter fell upon him. Vomiting and hiccup were present, but he felt no pain at any time, and lived for three days. Autopsy showed a rupture of the jejunum the size of a quill, with peritonitis.

Early collapse will frequently cause the pain to be apparently absent in the first hours after the injury; and opium used in treatment may conceal it at a later period, therefore care is necessary to exclude these sources of error.

*Tenderness.* We have notes as to the existence of tenderness in the early period in 62 cases. Tenderness was present in 55 cases—89 per cent.; and absent in 7 cases—11 per cent. It is described as great in 20 cases, and as slight in 4 cases. In one of the cases in which it was absent the statement is made that the pain was relieved by pressure. Of the seven cases in which tenderness was absent at first, its later appearance is noted in three, and one other, a child of four years, run over by a dray, was in collapse from the time of the accident until death, five hours later. In the remaining cases no mention is made of its later development, although life lasted one, two, and two and a half days. The following case is remarkable for the slight pain and tenderness:

A man,<sup>2</sup> thirty-two years old, fell twenty feet, from a tree, flat upon the ground, face downward, but arose and walked two hundred yards. In one hour there was pain in the abdomen, very little shock, and retention of urine. In three hours he vomited a little blood in clots, and the temperature rose to 100.6° F., but he remained cheerful. In twenty hours he could bear firm pressure on the belly, but there was tenderness in the iliac region. In twenty-four hours the belly was distended, he had pain for one hour, but it passed off. He remained comfortable and cheerful, and died quietly thirty-six hours after the accident. A rent in the ileum, which admitted three fingers, was discovered on autopsy.

*Distention of the abdomen.* This condition was present early in 33 cases, and later in 9—a total of 42. In 5 cases the belly is described as tense. Distention occurred at once in 2 cases; in 1 case it occurred "soon;" in another it immediately followed the reduction of a hernia upon which the blow had been received; and in 1 case it took place suddenly when the patient went to the closet to stool, some hours after the accident. Distention was absent at first in 16 cases, but it probably occurred later in most of those who live long enough to develop peritonitis.

*Tension of the abdominal muscles.* In 8 cases the abdomen is described as "tense," or "rigid," or "hard." In 8 the abdomen was "soft," or "natural," and in 8 others there seems to have been no contraction of the abdominal muscles. Therefore, the flat and tense belly, which is looked upon by some as symptomatic of perforation of the gut,

<sup>1</sup> Yellowlees: Glasgow Medical Journal, 1875, vii. p. 415.

<sup>2</sup> MacLean: British Medical Journal, 1884, i. p. 267.



is frequently absent, for we have seen that the belly is usually distended, and even when flat it is more frequently soft than hard.

*Tympanitic resonance.* The percussion note was tympanitic in 25 cases in the early stage, and later in 6 others. In 4 cases this is the only description given of the belly, leaving us in doubt as to whether distention was present or not, but in only 1 case is it expressly stated that there was no distention. We may fairly assume that the percussion note was tympanitic in the cases in which distention was present. This would increase the total to 36 cases.

*Dulness on percussion.* In 6 cases an area of dulness was detected in the early stage, and in only 2 later.

*Loss of liver dulness.* The disappearance of the dulness on percussion over the site of the liver has long been considered a valuable sign in perforation of the intestine. Its uncertainty has also been frequently alluded to, especially its uncertainty as a negative sign. In only 4 of the cases collected has this point been noted. In 3 cases the liver dulness persisted, but in 1 of these the perforation was in the duodenum and extraperitoneal. In 1 case<sup>1</sup> the results of percussion were at first normal, but in twelve hours tympanites developed and the liver dulness disappeared. We have then 2 cases in which it persisted to 1 in which it was lost. The latter case, indeed, is conclusive evidence that loss of liver dulness is not an immediate and necessary consequence of perforation of the bowel, else it would have occurred in that case at once, if at all.

It is evident that this sign depends upon certain conditions. There must be gas in the intestine, and it must escape before adhesions which could limit it have time to form; for although it is possible for gas to be generated in the peritoneal cavity this is a rare occurrence. The liver, too, must be free from adhesions which would retain it in its position. Even as a positive sign, loss of liver dulness cannot be relied upon, unless it is certain that it had been present previously. The various conditions which might mislead in this respect are cirrhosis, backward dislocation of the liver, extreme tympanites, or an actual misplacement of the colon between the liver and the abdominal wall. The first condition could scarcely lead to error, for there would be the presence of other symptoms of the disease, even in the absence of any history. Dislocation of the liver is a very rare condition, and so is the misplacement of the colon, but if the latter ever occurs during life it would be likely to be found after such severe disturbance of the abdominal organs as must be occasioned by the great force which produces these injuries. Extreme tympanites is the condition which will most frequently trouble the surgeon in this respect, but if the liver has been forced above its normal

<sup>1</sup> Beck: Deutsche Zeitschr. f. Chirurgie, xv. i. p. 11.

position that fact can generally be determined by careful examination of the thorax. We may, therefore, conclude that total absence of liver-dulness is a tolerably certain proof of rupture of the intestine in these cases, but that its persistence is of no value as a sign that there is no perforation.<sup>1</sup>

**LATER SYMPTOMS AND COURSE.**—The later symptoms are chiefly those of peritonitis, or septicæmia. We must give fuller consideration to the temperature, the constipation, and the fecal vomiting.

*Temperature.* The temperature is noted in 38 cases. In 7 cases there was no rise at any time, and in 4 of these the temperature was sub-normal throughout. The average duration of life in these 8 cases was forty-four hours—not much less than what we shall find to be the average duration in all cases—forty-eight hours. Of the 31 cases with fever, the rise began during the first six hours in 7 cases, during the first twelve hours in 15 cases, and in all but 5 cases during the first twenty-four hours. One exceptional case had no fever until the fourth day. The highest temperature of the first six hours was 39° C. The average duration of life in the 30 cases with fever (one case being omitted, because laparotomy was performed) was sixty hours.

*Constipation.* In 22 cases there was no stool until death—an average of three and one-half days, and in 3 others the bowels were moved by purgatives. In 5 cases the bowels were moved, and in 1 of these there was diarrhœa, but the latter may have been accidental, and not caused by the injury. Blood was present in the stools in only 1 case, and in another the stools were black. This fact and the prevailing constipation show how valueless the well-known symptom of “bloody stools” will prove in diagnosis.

*Fecal vomiting.* Fecal vomiting occurred in 12 of the cases collected, being nearly 10 per cent. of the whole, and 17 per cent. of all the cases in which vomiting took place. It is, therefore, rather a common symptom. Fecal vomiting began as early as twelve hours after the accident in 1 case, and in 7 cases within the first thirty-six hours; in the other 5 cases it began on the third to the fifth day. In 2 cases there had been no previous vomiting, and in these the fecal vomiting began late. In 5 of the cases there was no stool, and in the rest the state of the bowels is not described, but as all but 1 of these died within thirty hours of the accident their testimony is not important. When the case is obscure, and fecal vomiting and constipation are both present, the likeness to intestinal obstruction may be very close—as it is in those cases of non-traumatic perforation-peritonitis in which laparotomy has been performed under a mistaken diagnosis. In one of the cases which began late, autopsy showed a complete obstruction of the gut at the point

<sup>1</sup> For a full discussion of this question see Ebstein's paper on perforation-peritonitis, *Zeitschr. f. klin. Med.*, 1885, ix, p. 209.

of rupture. In the other late cases it may have been caused by the mechanical obstruction caused by the forming adhesions. But in the early cases it is not so easy to explain, although a similar symptom is found in peritonitis due to perforating ulcer of the intestine. We might suppose a spasmodic or paralytic obstruction caused by the shock due to the injury, to the beginning peritonitis, or to the mere presence of fecal matter in the peritoneal cavity—but the whole matter is as yet too obscure to warrant even a supposition.

The peritonitis which the fecal vomiting accompanied was evidently septic or purulent, except in two cases which are described as "fibrinous," and, perhaps, here also, for it is not easy to exclude the septic element in such cases, yet in one of these there was no fecal extravasation to be detected.

The situation of the rupture in the bowel seems to exercise no influence upon the occurrence, or the time of appearance of this symptom, for it accompanies ruptures in all parts of the intestinal canal.

Fecal vomiting was usually a sign of impending dissolution, appearing within twelve hours of death in 5 cases, although 2 cases lived three days after it began. The prognosis is worst when it begins in the first twenty-four hours, for of 6 such cases 5 died within thirty hours after the accident. All the cases in which fecal vomiting occurred are divisible into two classes: 5 cases which died within thirty hours of the accident, and 7 cases which lived from three to eight days, and there is a remarkable absence of cases living what we shall find to be the most common length of life after the accident—forty-eight hours.

COURSE.—In studying the course of rupture in the intestine we must distinguish three sets of cases:

In the first set the shock caused by the accident never leaves the patient, may never diminish, but passes rapidly or slowly into a collapse which lasts until death. While this is a characteristic of the cases in which hemorrhage accompanies the injury, it is not confined to them, for we have seen that the accident itself, or fecal extravasation (occurring at the time, or subsequently) may produce a collapse which will prove fatal in a few hours. In this set of cases the duration of life is short, and may be even less than an hour, but occasionally it may be prolonged for days. When death is delayed, it is impossible to distinguish the boundary line dividing shock from septic poisoning, but the latter is the true cause of death if death does not occur soon after the accident, unless fecal extravasation has also been delayed. In the rare cases in which symptoms do not develop immediately, the clinical history begins with the first appearance of the symptoms, rather than with the accident. The still rarer cases in which there is no shock at any time must be classified with the following—omitting the first stage of shock and reaction.



The second set of cases includes those in which a frank peritonitis develops, with abdominal pain and tenderness, tympanites, and fever after the shock has passed off. These are the cases in which the diagnosis is easiest, but, unfortunately, they are not the most common.

The third set of cases is the most numerous. It comprises those in which, instead of an evident peritonitis after reaction from the shock has taken place, there are vague symptoms which keep the surgeon in expectation that peritonitis is about to develop, but nothing upon which he can found a positive diagnosis, for such light indications are common enough in the cases in which ultimate recovery has taken place. The patient lies in a state of apathy, seemingly satisfied with his condition, and thus misleads those about him; or he becomes gradually weaker, and because less able to complain, appears to be improving; or the symptoms of peritonitis develop by degrees, and so slowly that no one can say of any moment that it marked the beginning.

**PROGNOSIS.**—The prognosis in rupture of the intestine may be said to be absolutely bad, for even a suppositious case of recovery after this accident is so rare as to be a surgical curiosity. The following case<sup>1</sup> possesses great interest in this connection:

A blacksmith, forty-seven years of age, was struck in the right iliac region by the butt of a shotgun, which discharged unexpectedly while he was holding it. He immediately felt chilly and weak, and agonizing pain and vomiting soon set in. In forty-eight hours he was suffering from an acute attack of peritonitis, the belly somewhat swollen and hard. At the site of the injury there were tenderness and dulness on percussion; elsewhere tympanitic resonance. There was no external mark of injury. The stomach rejected everything; there had been no stool. He was very sick for five days, then improved. Ten days after the injury, getting out of bed, he became entangled in the blanket and fell upon the floor, face downward. Immediately he had frightful pain in the belly, vomiting began, collapse set in, and he died in fourteen hours. The autopsy showed the omentum adherent to the wall of the abdomen at the site of the blow, the intestines adherent and injected. Between the parietal peritoneum and the muscles was an extravasation of blood, the size of the palm of the hand. In a loop of intestine, lying half way between the umbilicus and the pubes, was a rent admitting four fingertips. Fecal extravasation.

It is probable that in this case a small rupture took place at the time of the blow, with an extensive contusion of the gut. Adhesions closed in both, and the fall separated these and also tore open the weakened contused part.

*Duration of life.* An average computed on 112 cases gives the duration of life after the accident as forty-eight hours. That this average is not obtained by the union of extremes, but is a natural one, is shown by the fact that 8 cases died in the first twelve hours, 52 cases (46 per cent.) in the first twenty-four hours, and 82 cases (73 per cent.) in the first forty-eight hours. 4 cases lived eight days.

<sup>1</sup> Atlee: Med. and Surg. Reporter, lii. p. 6, 1885.

Evidently nothing is to be hoped from nature, and whatever improvement is to be made in the prognosis must be obtained by operative treatment. The history of what the latter has done up to the present time can be told in a few words. Omitting the cases of rupture of the intestine in a hernial sac, treated only by the ordinary operation for hernia, there have been recorded eight cases<sup>1</sup> of laparotomy with treatment of the ruptured intestine—six times by suture, twice by the clamp. Of these cases, six died soon after the operation; Bouilly's case lived ten days; Croft's four weeks.

In addition to these cases, laparotomy has been performed four times after contusion of the abdomen,<sup>2</sup> the lesions present being contusion of the colon and pancreas, rupture of the spleen (two cases), and rupture of the liver. These five cases terminated fatally, but the operation did no injury, and in some instances brought about a temporary improvement.

Two of the cases of laparotomy for rupture of the intestine can be claimed as recoveries, for Bouilly's case died of a fresh peritonitis set up by a rough examination of the artificial anus, when the original inflammation had entirely subsided; and Croft's case apparently died of inanition due to the artificial anus. In all the other cases the operation was undertaken so long after the injury that there was no hope for success. These two cases, however, with the case reported by Mikulicz,<sup>3</sup> prove that a peritonitis with fecal extravasation is amenable to surgical treatment. We may, then, confidently expect better things in the future, although the cases with very obscure symptoms, and those in which collapse sets in very early, must always remain beyond the reach of treatment.

**DIAGNOSIS.**—In attempting to make a diagnosis of the precise injury produced by a contusion of the abdomen, the cause of the injury and the exact situation of the blow should first be ascertained as accurately as possible. Certain causes, especially the kick of a horse or man, have been shown to be particularly liable to produce rupture of the intestine. The site of the blow, too, will often give a clew to the organ which has been injured—the liver, spleen, or bladder. In order to cause a rupture of the intestine, the blow must be so directed as to crush the gut between the contusing body and the spine or pelvis. The existence of hernia, the presence of bowel in the hernial sac, and the wearing of a truss at the time of the accident, all increase the liability to rupture of

<sup>1</sup> Dr. Gregory (operated 1876, St. Louis): *Brit. Med. Journ.*, 1887, i. p. 1037. Demons: *Rev. de Chir.*, May, 1885, p. 421. Girdlestone: *Austral. Med. Journ.*, 1883, v. p. 100. Fitzgerald: *Ibid.*, p. 264. Bouilly: *Bull. Soc. de Chir.*, Paris, 1883, ix. p. 698. E. Owen: *Lancet*, 1885, ii. p. 663. Waggener: *St. Louis Cour. of Med.*, 1886, xvi. p. 204. Croft: *Brit. Med. Journ.*, 1887, i. p. 975.

<sup>2</sup> Chavasse: *Bull. Soc. de Chir.*, Paris, 1885, xi. p. 123. Willett: *St. Barth. Hosp. Rep.*, xix. p. 203. Mackellar: *Brit. Med. Journ.*, 1887, i. p. 1037. Croft: *Ibid.*, p. 976.

<sup>3</sup> Volkmann's *Samml. klin. Vorträge*, No. 262, p. 2315.

the intestine. A former attack of peritonitis, or the presence of hardened feces in the intestine would also naturally increase the danger.

*Contusion of the abdomen, with recovery.* About four-fifths of all cases of contusion of the abdomen end in recovery. Thus Bryant (*Surgery*, fourth edition, p. 485) states that in seventy-one consecutive cases of contusion of the abdomen treated in Guy's Hospital, there was injury to some of the viscera in seventeen, there was peritonitis ending in recovery in ten, and in the remainder the symptoms were of short duration, and there was evidently no visceral injury. A number of cases of contusion of the abdomen ending in recovery have been collected and studied, with especial reference to the symptoms of the first six hours after the accident, in the same manner as the cases of rupture of the intestine. Almost all of these cases have been collected from literature, and therefore represent the severest forms of this injury.

Let us consider the symptoms of these thirty-three cases in the same order as has been followed for those of rupture of the intestine. In simple contusion of the abdomen the symptoms are at their worst at first, and in nearly all the cases a progressive improvement was observed when the change had once begun. But some of them developed peritonitis—fever, abdominal pain, and tenderness, tympanites, and vomiting being present as its symptoms. In a solitary case<sup>1</sup> the patient rallied from the shock which was present at first, and relapsed later. But this is so rare an occurrence that such a relapse is an almost certain sign of internal hemorrhage or injury to some of the viscera.

Shock was present in 28 cases, absent in only 1—a far larger percentage than in rupture of the intestine. The shock was severe in a remarkably large number—18 cases (66 per cent.); while it is noted as slight in only 4 cases. The shock was also very frequently of long duration—in 60 per cent. of the cases. In only 6 cases was it noted as short. In 6 cases it lasted several hours, and in 3 cases twelve, twenty-four, and sixty hours respectively.

Restlessness was present in only 3 cases, in 2 of which it was great, evidently due to internal hemorrhage.

Vomiting was present in 14 cases, 4 of which are said to have been severe, and 2 slight. It is noted as absent in 10 cases, but in 4 of these there was nausea. Vomiting appeared later in 5 cases in which it had not been present at first, usually as a symptom of peritonitis. Fecal vomiting was never noted, but in 2 cases the vomited matter is described as "altered blood" and "dark like feces." Vomiting, then, is less severe than in rupture of the intestine.

The stools contained blood only once. Constipation was the rule, but was probably due to opium in most cases. 7 cases had no stool for from

<sup>1</sup> Le Gros Clark: *Diagnosis of Visceral Lesions*. London, 1870, p. 266. (Supposed rupture of the liver.)



two to four days; in 1 the bowels were regular; 2 had passages very soon after the accident, followed by constipation; and 1 had a free diarrhoea on the fifth day.

The urine was bloody in 3 cases; in 1 from contusion of the kidney, and in 1 perhaps from contusion of the bladder. Retention of urine was present in one-third of the cases in which the function of the bladder is noticed.

Pain was present in the abdomen in 29 cases, in 14 of which it was severe, and the pain may be as great as in any case of rupture of the intestine. Tenderness was present in 20 cases, in 8 of which it was described as great, and in 2 slight. There was no tenderness in 1 case, but it developed later also in this.

*Physical signs.* In 4 cases the abdominal muscles were tense. The abdomen was distended in 12 cases in the early stage, and in 2 others later, and distention is noted as absent in 1 case. This distention may occur immediately after the injury, proving that it must be a result of shock to the nervous centres, and very closely simulating rupture of the intestine, with escape of gas into the peritoneal cavity.

Tympanitic resonance was present early in 7 cases, and in 1 later. Dulness on percussion was present in 4 cases—in 1 at the site of the blow, and in 1 a movable dulness indicating fluid (blood) in the belly. The condition of the area of liver dulness is not given in a single case.

In fact, the symptoms are almost identical with those of rupture of the intestine, except in intensity and duration.

In a few cases of contusion of the abdomen it will be possible to decide what organs have been injured, but in by far the greater number of cases a diagnosis cannot be made. Thus local pain and tenderness would indicate rupture of the liver, spleen, or bladder; bloody urine, retention, tenesmus, and the facts learned by catheterization would allow of a diagnosis of rupture of the bladder; free blood or urine might give an area of dulness on percussion changing with position; signs of internal hemorrhage would make rupture of the liver or spleen probable, and next to these laceration of the mesentery; absence of these symptoms, and the presence of severe shock, great abdominal pain and tenderness, severe vomiting, and early development of peritonitis would favor rupture of the intestine. It will seldom be possible to decide, during the first six hours or more after the accident, whether the intestine has been ruptured or not. However slight the symptoms may be, it cannot be justifiable to declare that no visceral injury has resulted until several days, free from symptoms, have elapsed, for the symptoms may remain latent after injury to almost any of the abdominal organs, and such a course is not infrequent with rupture of the intestine and bladder. Even when the contusing force has been apparently trifling the greatest care should be exercised in giving a prognosis. If the

visceral injury is merely a contusion of the intestine, the appearance of serious consequences may be delayed as much as a fortnight.<sup>1</sup>

**TREATMENT.**—Since the establishment of the rule that in penetrating gunshot wounds of the abdomen, immediate laparotomy is necessary, without waiting for symptoms of injury to the intestine, some have sought to extend the application of this principle to penetrating stab-wounds, and to all severe contusions of the belly. It is true that if rupture or severe contusion of the intestine has taken place, death is inevitable, unless laparotomy is performed at a very early period, just as this is true of gunshot wound of the bowel. But the intestine will almost certainly be wounded with penetrating gunshot wound of the belly, while in the severest forms of contusion, let the force be the most violent and the symptoms the most acute, there are, as we have already shown, many chances that the gut shall escape unhurt. Accordingly, the treatment of contusions of the abdomen must be wholly symptomatic—the surgeon having no right to assume that rupture of the intestine has taken place until symptoms appear which indicate its occurrence.

If it is apparent that hemorrhage is present, we should try to control it by pressure upon the abdomen, a firm pillow being bound upon it as tightly as can be endured, although one of the experiments on dogs showed that but little advantage is to be gained from any pressure which can be borne without anæsthesia. Morphine should also be given with care to quiet the circulation, and to relieve the intense pains in the belly and limbs, sometimes so excruciating that no amount of the drug consistent with safety can entirely prevent them, and stimulants must be withheld as far as possible. If the patient continue to sink, the surgeon should proceed at once to laparotomy, for many of these cases bleed to death from vessels which could be easily reached and ligated. To inject blood or salt solution into the veins of a patient while the blood is escaping elsewhere, is like pouring water into a vessel with a hole in the bottom, or as if one should treat a woman, dying of hemorrhage from placenta prævia, by transfusion without putting a tampon in the vagina.

After the vessels have been secured, stimulants and transfusion come into their proper place, and must be called upon at once to make up the loss of blood. Great collapse would contraindicate any operative interference, for laparotomy demands a certain amount of strength in the patient, and when the latter is very weak, it is already too late to save his life by operation.

If the case present no sign of hemorrhage, or if the hemorrhage soon cease, and there are no evident symptoms of rupture of the intestine, expectant treatment must be adopted; absolute rest in bed, very limited fluid diet, administered in small quantities, as little morphine as possible,

<sup>1</sup> L. Muguier: Thèse de Paris, 1883, reviewed in *Centralbl. f. Chir.*, 1884, p. 181.

in order not to obscure any symptoms about to develop, and continuous watching of the patient to detect the slightest change, for the only chance of success in these operations depends upon their performance at the earliest possible period, before septic poisoning and peritonitis can fully develop, and before the strength of the patient has been exhausted by pain and vomiting. Every rude method of examination, such as rough pressure on the abdomen to detect points of tenderness, or attempts to elicit "succussion sounds," are to be carefully avoided. Ordinary diet, large quantities of water, emetics, purgatives, and even enemata are to be absolutely prohibited. It is important to give no more morphine than is necessary to make the patient's sufferings endurable, seeking rather to relieve pain by hot applications to the abdomen, if no hemorrhage is present. Morphine probably acts in peritonitis only by relieving pain, and diminishing peristalsis. If we had the power of instantaneously and completely paralyzing the peristaltic movements of the gut immediately after rupture of the intestine had taken place, doubtless the best treatment would be to stop them at once and not allow them to recommence until time had been given for the formation of permanent adhesions. But we have no such power, for it is improbable that morphine can produce its effect upon peristalsis in time to prevent fecal extravasation, as the escape of feces probably occurs in most cases within a few minutes of the accident. The benefits to be gained by immediate and energetic use of opium in these cases do not counterbalance the greatly increased risk for the patient caused by the concealment of symptoms upon the early recognition of which his safety depends, if rupture of the intestine has taken place.

A typical case of rupture of the intestine would present shock, great abdominal pain and tenderness, severe vomiting, and perhaps a rise of temperature in the first few hours—the symptoms not improving with time. The physical signs, abdominal distention or retraction, loss of liver dulness, etc., might or might not be present. But the chief difference between these cases and those in which the intestine has escaped injury is the persistence of the symptoms, or their continued aggravation, and sufficient time must be allowed to elapse to determine this point—at least six hours. In a well-marked case with these symptoms, laparotomy is justifiable. If shock, pain, or tenderness be absent, the case is doubtful, and operation must be delayed until it becomes clearer. By far the largest number of cases will fall into this latter category. If there is a strong probability of rupture, an explorative operation is advisable; but the decision when operation is indicated, and how far it should be carried, must be left in each case to the judgment of the surgeon, as it is impossible to formulate rules for distinguishing cases which shade off into one another by such insensible gradations.



A few words are necessary in regard to the technique of these operations.

The incision must be a long one, for we have to deal with the normal abdomen; not distended, and with atrophied tissues, as in cases of abdominal tumor. The length of the incision for the exploration should be at least four inches. The length for the complete operation, when all the intestine is to be drawn out for examination, and the examination cannot be complete without this, should be at least eight inches, unless the abdominal walls are unusually relaxed. The centre of the incision should, as a rule, be at the umbilicus; but if it is evident that the injury was inflicted very high up, it may be advisable to have it an inch or so higher, to facilitate examination of the stomach. The incision should not be made lower, for the attachment of the mesentery may interfere with turning out the intestine, especially if the mesentery is short, or thickened with fat.

The peritoneum should be inspected before it is incised. If there be blood in the cavity it will probably make its presence known through the transparent membrane, but care must be taken not to confound an ecchymosis of the omentum lying under the incision with free blood, and the distinction will not always be easy. It will be possible, also, to ascertain the presence of gas, pus, or even congestion of the peritoneum, in some cases. The peritoneum having been inspected and incised, a sponge on a long forceps is to be passed into the pelvis, and examined on withdrawal for blood, pus, or feces. The same should be done for each lumbar region. It must be remembered that fecal odor is not an absolute proof of the presence of feces, for a fluid in the belly may contract this odor through mere contact with the intestine.

Parkes has already pointed out<sup>1</sup> that simply opening the abdomen will often cause the hemorrhage within it to cease, the contact of the air making the vessels contract, and the blood coagulate more firmly and rapidly. While this is true, especially when the bleeding proceeds from small vessels, the opening of the belly removes from its contents the pressure of the abdominal walls, and in some cases the hemorrhage will increase, instead of diminishing. Thus, in some of the experiments upon dogs, it was observed that the first serious symptoms of loss of blood appeared at the moment when the peritoneal cavity was opened, and the blood gushed from its interior. Dennis<sup>2</sup> suggests that a tourniquet without the pad, or an Esmarch elastic tube be placed around each thigh before the cavity is opened, and kept in place until the bleeding vessels have been secured, in order to save at least the blood contained in the lower extremities.

<sup>1</sup> The Medical News, May 17, 1884, p. 564.

<sup>2</sup> The Medical News, March 6, 1886, p. 254.

In performing laparotomy for internal hemorrhage, every step of the operation should be executed with the greatest rapidity. As soon as the belly has been opened, and a large amount of blood is seen welling up from the bottom, the operator should lift up the omentum, quickly pass his left hand underneath it, upward and backward, and make pressure upon the abdominal aorta and the root of the mesentery, at the highest point which can be reached. The hemorrhage will thus be temporarily controlled. With his other hand, and the aid of his chief assistant, the entire small intestine is to be quickly turned out, the mesentery being inspected as this is done, and any bleeding points seen secured at once with clamps; another assistant wrapping the intestines, as soon as brought out, in towels which have been soaking in a hot 1 to 4000 bichloride solution. The abdominal cavity is to be rapidly emptied of blood and clots, and all bleeding points seized. The pressure upon the aorta may then be gradually relaxed, the operator watching to see if all the injured vessels have been properly secured.

Up to this time stimulants should have been given with caution, so as not to interfere with nature's efforts to stop the hemorrhage, but now they must be pushed with energy, and if the patient is very weak, the salt solution must be prepared for transfusion. All the vessels having been tied with catgut, a more careful examination of the intestine is to be made, to discover any injuries to the gut, or any loops which have been deprived of their blood supply by injuries of the mesentery. Even in the first hurried examination it should be kept in mind that rupture of the gut may be present, and if any are found, the injured loops are to be wrapped in separate cloths, to avoid the danger of spreading the feces over the mass of intestines. In these cases it is probable that the patient will be too low to admit of so prolonged an operation as resection with suture, and it will be necessary to make an artificial anus.

If there were no injury of the gut, the cleansing of the peritoneal cavity, and the inspection and return of the intestine would require but a few minutes, and the abdominal wound having been partly closed by the introduction of a few deep sutures, a flat sponge being left inside as a further precaution, the operator would be at liberty to attend to the transfusion, completing the closure of the wound afterward. Even if the intestine were injured, all, except the injured part, could be returned after inspection and cleansing, the wound temporarily closed as just suggested, and the injured loops kept wrapped up in a warm cloth until the operator had made the transfusion. This early return of the uninjured parts was repeatedly found to have a remarkable effect in improving the pulse in the experiments on dogs, and will prove a very useful expedient when the shock is great; in fact, the intestines should always be returned as soon as the peritoneum has been cleansed.

But if the hemorrhage is not great, the operator should lift up the

omentum, and carefully draw out the intestine, one loop at a time, wrapping the gut in towels as he lays it to one side, until the whole has been examined. It is impossible to make a thorough examination without removing the entire small intestine from the abdomen. Attention should first be given to those parts lying directly under the blow, for this is most frequently the situation of the injured loop. If any injuries are found, if they are extensive, and there is much fecal extravasation from the wound, the injured loops should be wrapped by themselves in a cloth, and kept separate from the rest until the examination has been completed. But if the injuries are of small extent, and there seems to be no fecal extravasation from the wounds, they should be closed at once according to the simple (and yet original) method employed by Bull<sup>1</sup> in the suture of gunshot wounds of the intestine under similar conditions.

The injured loop is carefully laid upon a large flat sponge, and steadied there by an assistant who holds the mesentery and avoids all pressure upon the gut itself, while the operator carefully picks up the wall of the intestine with mouse-tooth forceps and inserts the Lembert sutures, tying each one as soon as inserted. The needle preferred by Dr. Bull is the delicate, curved intestinal needle of Schramm. Fecal extravasation is avoided by the extremely careful handling of the gut, and the edges of the wound remain unsoiled, a great improvement on the ordinary method of removing the feces from the neighborhood of the wound by pressure upon the gut before the sutures are inserted, for it is almost impossible to do this without the escape of a small quantity, and the contamination of the edges of the wound.

All the intestines having been inspected, and all injuries treated at once or laid aside for later treatment, the peritoneal cavity is to be thoroughly cleansed with sponges. If there has been a rupture of the intestine, even if it is very small, and even if there has been no perceptible fecal extravasation, the whole cavity must be flushed with a 1 to 10,000 bichloride, or a 1 to 100 carbolic acid solution, at the temperature of the blood, or warmer. Still better would be plain water which had been kept boiling for at least an hour and then allowed to cool off, or cooled by the addition of cold water which had been previously boiled in the same way. A large quantity of water must be used, the cavity being filled and emptied several times. The warm water will be found to improve the condition of the patient, and, therefore, collapse is no contra-indication to this flushing out of the belly.

The cavity having been cleaned, those portions of the intestine which are uninjured, or have been already treated, should also be thoroughly douched with the water, and, if much feces has escaped, should be well scrubbed with sponges. In cleaning the intestine, great care and many

<sup>1</sup> The author is indebted to Dr. Bull for permission to describe this method.



sponges will be necessary to prevent the fluid from running down the funnel formed by the mesentery, into the belly, which has just been cleaned. All these parts of the intestine can then be returned to the abdomen, only the loops still untreated being kept out. When excessive distention of the gut by gas interferes with its return to the belly, punctures may be made with a coarse aspirating needle, if care is taken to avoid escape of feces, and the punctures are closed by a couple of Lembert sutures to prevent subsequent leakage. If the large intestine be distended, a long flexible tube may be inserted into the rectum, and by manipulation through the walls of the gut it can be easily carried up beyond the sharp bends in the sigmoid flexure which usually impede its advance, and the entire colon thus emptied of gas.

We have seen that there are three varieties of injury to the intestine to be expected, deprivation of blood-supply by injury of the mesentery, contusion or laceration of part of the coats of the gut, and rupture of all the coats for the whole or part of the circumference of the bowel. If the blood supply has been hopelessly destroyed in any part and gangrene is inevitable, that part must be removed. If the injury to the intestine is merely a laceration of part of its coat, or a contusion, suture will be necessary if the laceration involves more than the peritoneum, the injured spot being simply turned into the lumen of the gut and the folds thus made in the wall united over it by the Lembert suture. In these lacerations, the peritoneal, and even the deeper coats, are sometimes stripped off for a considerable extent, and resection of the injured part may be necessary.

The small ruptures will often allow of suture without resection, like bullet-wounds of the gut, the more so, that these ruptures do not often involve the mesenteric border, and hence do not interfere with the blood supply. Of intestinal resection and suture we need not speak further.

It is probable that the creation of an artificial anus will be the operation best suited to most cases of rupture of intestine in contusion of the abdomen. The collapse of the early stages, and the exhaustion later (when it has been impossible to make an early diagnosis) will in the great majority of cases prevent any attempt at such a prolonged operation as resection of the intestine with suture, and the latter should be reserved for the most favorable cases. It will be easy to restore the continuity of the gut at some later time when the patient has recovered from the accident, and the dread of having a permanent fecal fistula need not be allowed to weigh in the decision of the matter.

In making an artificial anus in these cases, both ends of the gut are to be occluded with ligatures or clamps, and as it will not be necessary to empty the gut at once, these may be left in place for twenty-four hours or longer, to allow adhesions to form and granulations to spring up, thus avoiding all danger of infection by escaping feces.

The creation of an artificial anus will greatly shorten the duration of a laparotomy for rupture of the intestine, and should be used in every case in which the patient's strength is doubtful. The operation admits of still greater abbreviation, if the patient is in a desperate condition, by securing the ends of the gut with a clamp or ligature, thoroughly cleaning the peritoneal cavity, passing the deep sutures for the abdominal wound further back from the edge than usual, in order to evert more peritoneum and make a broader peritoneal surface, and trusting to the pressure of these sutures, together with the aid of the clamp or ligature to hold the ends of the gut in place until the adhesions are firm. The entire operation performed in this way ought not to last more than half an hour, and would not be too much to attempt unless evidently fatal collapse had set in.

In performing laparotomy for supposed rupture of the intestine, the surgeon must be prepared to deal with any injury to the other abdominal organs. Rupture of the stomach would be treated on a similar plan to rupture of the gut. Rupture of the bladder would also be amenable to suture. In rupture of the liver, spleen, or kidney, it would be necessary first to control the hemorrhage—by ligature, deep sutures, the cautery, or pressure by a tampon of iodoform gauze. The spleen or kidney could be removed. It is certain that great triumphs await the surgery of the future in the treatment of these formidable injuries.

Undoubtedly in many cases of rupture of the intestine the patient will be too weak to permit of any operation, for it is certainly not justifiable to perform laparotomy when the patient is in collapse. This has already been done too often, as may be seen by the cases reported. Nothing is gained by such operations, and they bring discredit upon the surgeon and his art. If the patient is so feeble that it is impossible to bring about an improvement by the ordinary stimulants, he will certainly not survive laparotomy.

We may sum up the practical results of our inquiry in the following:

CONCLUSIONS.—1. The treatment of contusion of the abdomen should be purely expectant in the early stage, until symptoms of internal injury have appeared, or until the full extent of time in which they may be expected has passed. Explorative laparotomy at this time is inadmissible.

2. When symptoms of uncontrollable internal hemorrhage, or serious visceral injury appear, laparotomy is indicated; but, when the diagnosis is uncertain, the operation should always be begun as an exploration.

3. Great collapse is an absolute contraindication to all operative interference.

4. When rupture of the intestine is found, the best method of treatment is to secure the injured gut in the abdominal wound, and form an artificial anus. This can be easily relieved by a later operation, when the patient has recovered his strength.

ON HEPATIC CIRRHOSIS IN CHILDREN.<sup>1</sup>

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HAVING met with two cases of that rare affection in children, cirrhosis of the liver, I venture to make them the subject of a few observations; not that I hope to remove the obscurity which surrounds the subject, but rather to add to the few examples already recorded two more, in which neither the use of alcohol nor the virus of syphilis can be assigned as the cause of the hepatic cirrhosis.

The infrequency of cirrhosis of the liver in children may be substantiated by a few quotations. Thierfelder<sup>2</sup> speaks "of the absolute rarity of the affection as regards children." Henoch<sup>3</sup> admits that he never found the disease "fully developed in children." Dr. Charles West<sup>4</sup> states that "an experience of 70,000 cases of children's disease had yielded him but four examples of hepatic cirrhosis." The late lamented Flint, in a private letter to me respecting one of the cases about to be reported, dated December, 1884, remarks that "in so young a subject the disease is exceedingly rare." And Neureuter<sup>5</sup> estimates its ratio to other diseases admitted into the Franz Joseph Hospital for children at one-tenth of one per cent.

I will first relate the two cases that have been under my own care.

CASE I.—Miss —, aged nine years, was brought to me in November, 1878, on account of a few nævoid-looking groups of vessels on the right eyelid, which had formed, her mother thought, since a severe attack of pertussis experienced in the preceding July. On January 27, 1879, my services were again sought, because the child had been "poorly for some weeks." It was subsequently admitted that she had not been well for several months. She had been weak, fretful, nervous, and unable to perform her school-work, and her appetite had failed. Her leading symptoms at this first visit were a subicteroid tint of skin and conjunctiva, and enlarged liver, its lower margin extending an inch and a half below the ribs; the spleen also in the same condition, and its lower end perceptible two inches below the ribs. The upper abdominal zone was very perceptibly enlarged; indeed, her mother had for some time thought the child's waist increased in circumference. Pulse 114; temperature 103 $\frac{4}{5}$ ° F.; tongue clean; urine of deep orange color; a loose cough, not explained by examination of chest, the organs in which were normal, so far as physical signs could be relied on. Expectoration scanty, semi-transparent, viscid, and pink from the presence of a minute quantity of blood.

<sup>1</sup> Read at the meeting of the Association of American Physicians, Washington, June 2, 1887.

<sup>2</sup> Ziemssen's *Cyclopedia*, ix. p. 175.

<sup>3</sup> *Lectures on Diseases of Children*, 1882, p. 232.

<sup>4</sup> *Diseases of Infancy and Childhood*, 7th ed., p. 654.

<sup>5</sup> *Oesterreichisches Jahr. für Paediatrik*, 1877, viii.



*Personal history.* Is one of four children; all of whom are living and healthy, except a brother, who died of membranous laryngitis at five. All the four children have had symmetrical, handsome faces and figures, devoid of evidence of rickets, hereditary syphilis, or scrofula. The patient has always been healthy, and made good recoveries from measles, croup, chickenpox, and whooping-cough. She had escaped scarlatina.

*Family history.* Mother is remarkably healthy and well nourished. Mother's father died of valvular disease; mother's mother of disease of kidney; a maternal uncle of phthisis, and a maternal aunt of laryngeal diphtheria; another maternal aunt died of cerebral embolism from rheumatic valvular disease, a third from puerperal convulsions, and a fourth, three weeks after parturition, from some puerperal inflammation. Three maternal uncles and two aunts are alive, and enjoy good health.

The child's father, a vigorous, healthy man, has not had syphilis, and uses alcohol in moderation. The paternal grandfather had always been healthy, and died in advanced life; the paternal grandmother died when comparatively young, the cause of her death is not known; all the other members of father's immediate family, viz., a brother and two sisters, are living and healthy.

It would occupy too much time to report the daily notes, and the leading facts must suffice.

A febrile temperature prevailed throughout the four months that the child lived after coming under observation. During the first four days of February it was  $104^{\circ}$ , and for the rest of the month it ranged between  $101^{\circ}$  and  $100^{\circ}$ . The average daily temperature for the first fourteen days of March was  $100.7^{\circ}$ , and for the remainder of the month about  $99.4^{\circ}$ . For the first week of April the temperature ranged between  $101^{\circ}$  and  $100.5^{\circ}$ , for the second week between  $100^{\circ}$  and  $99^{\circ}$ , and for the rest of the month between  $100^{\circ}$  and  $98\frac{4}{5}^{\circ}$ , although it was but three times below  $99^{\circ}$ . For the first half of May it ranged between  $100^{\circ}$  and  $101^{\circ}$ ; during the last ten days of the patient's life the temperature was not recorded.

Epistaxis was frequently present throughout the illness, in moderate amount, yet sufficient to soil three handkerchiefs a day. It had occurred, however, very often since the attack of whooping-cough in July.

Hemorrhage from the kidneys was also a persistent symptom after its first appearance on February 25th. The urine was rarely free from blood after that date, but the removal of the pressure of the ascitic fluid by tapping was followed by a temporary sensible reduction in the proportion of blood contained in the urine.

In the early part of February pain of the character of "bellyache" was experienced in the umbilical region for one day, but it was unaccompanied by tenderness on pressure. Pain in the splenic region was complained of for three days before the first tapping, which was performed on April 7th. It did not recur in that region for three weeks, at which time the belly was rapidly refilling. But the night succeeding the first tapping, pain occurred in the right side of abdomen, and persisted for the four succeeding days; yet it was unaccompanied by tenderness, or a higher temperature than had immediately preceded the paracentesis, and the ascitic fluid was found to be transparent even after the third tapping, which became necessary a fortnight after the second.

From these facts it may be concluded that the turbid serum and recent

lymph found in the peritoneal cavity after death, were the products of a latent peritonitis which succeeded the last paracentesis.

Perceptible enlargement of a few veins in the epigastric zone, was noted on February 10th; by May 3d many large mammary veins were found inosculating with these; and by May 17th the thoracic and abdominal parietes were covered by numerous large veins, suggestive of the serious obstruction that existed in the portal system.

Ascites was first noted on March 4th. It resisted digitalis, squill, cream of tartar, potassium iodide, and an occasional cathartic or an active diaphoretic; and tapping became necessary on April 7th, when nine pints of transparent citron-colored serum were removed. The operation was repeated on April 21st, and, for the third time, on May 4th, upon which occasion eleven pints were evacuated.

A reduction in the size of the spleen was noticed after iced compresses had been applied over the organ three times a day for thirty to forty minutes at a time, but a month afterward the organ had regained its former size.

On the 26th of February, the day after the first occurrence of hæmaturia, the *urine* had a sp. gr. of 1.022, and a smoky appearance, but no marked sediment. It contained about one-third by volume of albumen, many leucocytes and blood-corpuscles, very few highly granular hyaline casts, and in the same field a single waxy and a single epithelial cast. The urine of the 5th of May had a sp. gr. of 1.014; it contained only one-twentieth of its volume of albumen. Numerous blood globules, several large epithelial cells containing numerous fat globules and a single hyaline cast, were seen in one field.

On the 10th of April my friend, Dr. Osler, counted the blood-corpuscles and reported 2,400,000 red per cubic millimetre, and 1 white to 144 red. Six days later, with the same proportion of red corpuscles, the ratio of the white to the red was 1 to 91. From the report of the latter date the following memorandum is taken: "Nothing of special note about the corpuscles—red natural, of uniform size; no microcytes. Whites of natural appearance; very little variation in size; no nucleated red corpuscles."

On the 12th of March a troublesome dry cough set in, accompanied by fine bubbling in the bases of the lungs without the whistling rhonchi of bronchitis. About the same time a moderate general puffiness of hands, feet, and legs appeared, symptoms which, when taken in connection with the character of the urine a fortnight before, probably indicated a renal source. The state of the kidneys after death favors this view. During the last eight or nine days of life grave disturbance of the nervous centres occurred; delirium, ravenous appetite, tearing of bedclothes, a soporose passing into an unconscious state. Next day recovery of consciousness, involuntary evacuations, reticence or actual inability to speak (not established which), extremely dilated pupils, twitchings. Then a half-conscious condition attended with monotonous expression, general restlessness, and moaning. Death took place on the 23d of May, four months from the time that she came under treatment.

*Autopsy* made next day by Prof. Osler. Eleven pints of turbid serum with flocculi of recent lymph in peritoneal cavity. Adhesion of great omentum to intestines. Parietal peritoneum thick and granular-looking, chiefly in the upper abdominal zone and on the diaphragm.

Spleen about three times normal size; capsule thickened; texture

tough, resisted the knife. Liver, right lobe adherent by thick layer of imperfectly organized lymph to under surface of diaphragm. The organ was large and thick; very granular; tough, resisting the knife; of a dirty white color; very anæmic—fine specimen of hypertrophic cirrhosis. The new fibrous tissue extended throughout the entire organ and appeared to be “mono-lobular.” Gall-bladder contained a little clear citron-colored fluid. No gall-stones or obstruction of the biliary ducts.

A laminated colorless coagulum within vena porta and loosely attached to its lining membrane. Stomach, suprarenal capsules, intestines, and bladder normal.

Kidneys large and deeply congested; cut surface coarse; capsule easily torn off; a moderate serous effusion into right pleura; a fine granular exudation over pleura covering lower lobe of right lung; some clusters of gray tubercle in the upper lobe of both lungs; a caseous nodule size of dried pea in left upper lobe, and a caseating bronchial gland at root of right lung. Heart, brain, and cord not examined.

CASE II. occurred six years after the first, in the brother of the little girl whose history has just been read.

He appears to have had in previous years the same diseases as his sister, and like her to have escaped scarlatina. Some two years before the detection of the illness about to be described, this boy, then eight years old, was brought to me by his mother as he looked pale, appeared not to be thriving, and she feared that he might be the subject of the same affection as his deceased sister. Nothing definitely wrong was discovered at the time by me, nor, a few months later, by another physician; but the child improved while taking lactopeptin. In May, 1884, he was seen by me on account of a slight herpes circinatus, and his health appeared to be good at the time. The summer months were spent at the seaside, where he underwent a good deal of fatigue without apparent ill effect. For a fortnight after returning home he appeared to be in good health, but at the end of that period he became languid and unfit for work or play. I was then (12th of September, 1884) requested to see the child, and noted the following: subicteroid hue of skin and of the conjunctivæ; urine deeply bile-tinged; stools contained bile; waist appeared enlarged and epigastric zone prominent. Hepatic dulness extended from fifth space to over a couple of inches below the margin of ribs in the nipple line and well down into the epigastrium in the median line. The splenic dulness also much increased. Two small patches of enlarged venules under left eye and one upon side of the neck were present and of a bright red color, and exactly like those observed on his sister. No enlarged lymphatic glands, although twelve or eighteen months before a single gland in one groin was somewhat hypertrophied.

As in the first case, a febrile temperature was present. During the first month it ranged between  $99\frac{2}{3}^{\circ}$  F. and  $100\frac{2}{3}^{\circ}$  F., and during the second between  $100^{\circ}$  and  $101^{\circ}$  in the forenoon. It did not exceed the latter point at any time beyond half a degree.

The pulse-rate was lower than in the first case. It did not pass 90 till the middle of October. It gradually rose to 104 in the succeeding month, and reached 108 to 110 during the last week of life.

The liver and spleen enlarged rapidly, and in a month from the first examination their lower borders reached the horizontal level of the umbilicus. As in the previous case, the dimensions of the spleen subsequently became reduced, so that after the first tapping its lower border



was only about on a line with the margin of the left hypochondrium. It was found, however, an inch lower nine days later, after the second tapping. The liver also suffered a reduction in volume; for by the 5th of December its lower edge was only two inches below the margin of the hypochondrium, instead of reaching to the level of the umbilicus.

Epistaxis set in early in September and recurred several times, but only in small quantities. Hæmaturia was not observed, and only once, on the 19th of December, did blood appear in the vomited matters, and then the amount was trifling. Jaundice was present when the child first came under my care, and deepened with the advance of the case. The urine was always deeply bile-stained, but the stools were never devoid of bile.

The blood was examined but once (the 11th of October). It contained no excess of white corpuscles and was of a deep red color.

The existence of ascites was established on the 26th of November, and it increased so rapidly that the fluid required to be drawn off on the 6th of December, when five pints of transparent citron-colored serum were evacuated by means of an aspirator. A second tapping became necessary nine days after the first. The fluid had its former character.

Edema appeared in the feet and legs on the 12th of December, and reached the scrotum and lower part of trunk on the 14th. The distention of the scrotum became so considerable that on the 19th three or four needle punctures were made and the œdema permanently relieved thereby.

Numerous large veins, branches of the epigastric and mammary, were present in November, but they did not attain in either number or size the proportions observed in the previous case.

Pain, chiefly in the epigastrium and over the splenic region was first complained of on November 22d; it was unaccompanied by tenderness on pressure. It persisted about eight days and was very severe on the 30th of that month. After that the child frequently complained of pain in the belly which at the time I attributed to the distention of the abdomen.

On the 21st of December a peculiar delirium, attended by screaming and violent shaking of the hands, set in, and lasted about three hours. The same thing occurred on the 23d, and early on the 24th, and lasted about the same time. Coma supervened at 10 A. M. of the 24th. The respiration was slightly stertorous, with flapping of the cheeks; the pupils were widely dilated, but contracted on first exposure to light and then became as large as before. There were frequent tetanic spasms of the extensors fixing the forearm in rigid extension; rigidity of the lower limbs, the feet being rigidly extended upon the legs, and occasionally twitching of the eyelids. Death took place at 2 P. M., four hours after the advent of the coma.

*Autopsy*, twenty-five hours after death; cold weather. No cadaveric rigidity. Icteric hue of general integument. Five pints of orange-colored transparent serum, devoid of lymph flakes, in peritoneal cavity. No signs of acute or chronic peritonitis. Liver, two and a half pounds, enlarged; left lobe very broad vertically, right lobe also large and its posterior border very thick, the edges of anterior border thin; no adhesions of liver to adjacent parts. Its surface everywhere presented the typical "hob-nail" appearance. A shallow depression, about equal in area to that of a man's palm, was seen about the centre of

its convex surface and the granulations over this depression were very closely set. The substance was dense, resisted cutting very markedly, and was of a deep yellow color. Gall-bladder full of bile but not over distended. No gall stones present. Common duct pervious.

Spleen enlarged three or four times its proper size, not adherent to adjacent structures, and like the liver, free from opaque or thickened patches on its exterior. Substance firm, cut surface coarse-looking and exhibiting some dark, purple areas. The peritoneum and exterior of intestines normal. Right lung not consolidated. Left lung, kidneys, heart, and brain not examined. My notes of the autopsy contain no mention of tubercle in the right lung; had any been present I doubtless would have recorded their presence.

Dr. Wyatt Johnston, Demonstrator of Pathology in McGill University, has kindly given the following summary of the microscopical appearances of this liver. "The fibrous tissue is seen to be developed in connection with the portal system and surrounds the acini, which vary greatly in size and are nowhere very large. Where the fibrous tissue penetrates the acini it does so as a considerable bundle and not in fine intercellular filaments. The centres of lobules are free from fibrous tissue; central veins not dilated; bile ducts look natural. In the liver cells the nuclei do not stain deeply. This is owing, no doubt, to the long maceration in weak spirit, and to the same fact is probably due the apparent absence of small, embryonic, fibrous tissue cells at the border of the fibrous tissue."

Before making a few observations on the subject of cirrhosis of the liver it may be well to say that by that term is meant, in this paper, a diffuse development of the connective tissue of the liver without reference to the question of the inflammatory or the simple hypertrophic nature of that development. The word interstitial hepatitis is employed as synonymous with hepatic cirrhosis.

The known conditions in the human subject under which interstitial hepatitis occurs are somewhat numerous and may be thus classified or grouped:

1. Toxic or irritating substances entering the blood; (*a*) especially alcohol, (*b*) syphilitic virus, (*c*) malaria, (*d*) probably, but rarely, lithic acid when productive of the lithic acid or gouty dyscrasia,<sup>1</sup> (*e*) blood pigment in diabetes.<sup>2</sup>
2. Chronic congestion of the hepatic vein, as in valvular and pulmonary diseases, and in those rare affections of which I have seen examples, obstruction or obliteration of the hepatic veins, or of the inferior vena cava above entrance of the hepatic vein.
3. Adhesive inflammation of the portal vein (pylephlebitis), especially the syphilitic variety, three cases of which I have found reported.

<sup>1</sup> Thierfelder doubts this, but Murchison maintains it from his own observation: *Diseases of Liver*, 3d ed., p. 636, 1885.

<sup>2</sup> Hanot: *Arch. de Phys. Normal et Path.*, Paris, 3 s. vii. 50-87, and Latulle: No. 20, *Bull. et Mem. de la Soc. Méd. des Hôpitaux*.

4. Extension of inflammation to the interstitial tissue of the liver in chronic peritonitis, and in perihepatitis.

5. Obstruction of bile ducts, whether from congenital defects (absence of common duct) or from post-congenital disease (tumors, gall-stones, or experiment ligatures).

6. In association with tubercular disease, more especially of the lungs.

7. As part of a general tendency to new formation or hypertrophy of connective tissue in the system, the so-called fibroid diathesis.

I have not had time or opportunity to institute a very extensive search into the literature of the subject, but have collected sixty-one cases of cirrhosis of the liver in children up to the age of puberty, which, with two personal cases, give an aggregate of sixty-three.

It seemed to me best thus to limit the age rather than include cases even of young adults, for in the latter the influence of alcohol would probably be found to be a dominant one as it is in persons of middle age. I have also excluded cases of hepatic cirrhosis due to congenital defects of the biliary ducts. Confining our attention for the present to the *causative* relations of these sixty-three cases, some interesting facts are brought out.

In the first place, the above mentioned conditions under which cirrhosis of the liver is known to occur were alleged to be present in but thirty out of the sixty-three cases, leaving over one-half of these to be accounted for.

1. The ordinary cause of the disease in adults, the excessive use of alcohol, existed in only 10 of these cases of cirrhosis in children. Its absence was noted 47 times, and no mention was made of it in 6 cases.

2. A heredito-syphilitic origin obtained in 7 cases, the cirrhosis existing at birth in all but one, a boy sixteen years of age. One of these children was born in the thirtieth week of gestation, and another in the thirty-fourth week. The absence of syphilitic causation was affirmed in 29 cases, and no mention was made of it in 30 cases.

3. In 3 of the syphilitic cases the virus set up an adhesive peripylephlebitis which terminated in a diffuse interstitial hepatitis, and these are the only instances in the whole number of cases of hepatic cirrhosis in children in which adhesive inflammation of the portal vein was the starting point of the process.

4. Venous congestion of the liver, a not infrequent factor in the production of cirrhosis in the adult, existed in but a solitary case. The condition present, obliteration of the hepatic vein close to the vena cava, is exceedingly rare at all periods of life. I have seen one example of it.

5. The lithic acid diathesis is not once mentioned as having been present in these cases; and



6. The same is true of malaria and ague. The absence of malarial influence, however, is only affirmed seven times; it may often have been overlooked.

7. In a single case the existence of widespread false membrane in all parts of the abdomen and a complete envelope of it enclosing the liver, suggest that peritonitis may have extended to the capsule of the liver and excited the interstitial hepatitis. In another case there were numerous adhesions between the liver and surrounding parts, but no general peritonitis.

8. The association of hepatic cirrhosis with tuberculous disease obtained in 7 of these collected cases, perhaps in 8; about the same proportion as that in which cirrhosis and syphilis were coexistent.

9. There are recorded examples in the adult of the existence of cirrhosis of the liver along with a tendency to a condition of general fibrosis in the system.

In two cases, two organs, the liver and kidneys, were cirrhotic; and in two, three organs had undergone chronic interstitial fibroid alterations. Thus, in one the child had taken a great deal of wine between meals and the liver was typically cirrhotic, the spleen large and firm, and the mucous membrane of the stomach thickened. Again, a girl of thirteen, without a history of intemperance, had, together with extreme hepatic cirrhosis, evidences of old double pleurisy and old peritonitis. Another is that of an infant that died at birth, free from a syphilitic history, in which Virchow found cirrhotic changes in the liver, spleen, and kidneys coexisting with peritonitis. But the most striking instance of a general tendency to overgrowth of connective tissue is afforded by the case of a girl aged six, who occasionally "took beer at dinner, but did not like it," and in whom, in addition to cirrhosis of the liver, there was hypertrophy of the connective tissue, and an infiltration of small round cells in the spleen, kidneys, stomach, heart, and brain. The walls of the bloodvessels in all the organs were also thicker than natural.

In only six then of the fifty-seven examples of non-syphilitic cirrhosis of the liver in children, omitting those in which the liver and spleen, but no third organ, had undergone cirrhotic changes, can it be said that the hepatic cirrhosis was the outcome of a general tendency of the system to fibrosis; and in only one of them was found such a thickening of the walls of the bloodvessels as would justify the application of Gull and Sutton's theory of an arterio-capillary fibrosis as the source of hepatic cirrhosis, at least in children. It is, however, to be borne in mind, that the condition of the vascular system has very probably not often been investigated in this affection in childhood.

The instances in which a firm or tough condition of the spleen occurred in association with cirrhosis of the liver, other organs escaping such alterations, have not been included in the above illustrations of a

more or less general tendency to fibrosis, because the splenic alterations are reasonably explicable upon other grounds, such as habitual overstimulation of the spleen by passive congestion of its structure with portal blood, the blood, moreover, probably containing products irritating to that viscus. But it is only right to say that in thirteen instances, along with the hepatic cirrhosis, the spleen was found large and firm; and in two instances tough. In eight instances it is simply called "large," and in one "large and soft." It may be said that in twenty-four of the fifty-seven cases of the non-syphilitic group the spleen was abnormal.

Assuming that we have so far determined the causative relation of about one-half of these sixty odd cases of hepatic cirrhosis in children, what about the other half? Before attempting an answer to this question it will be well to recall the fact that in addition to the above mentioned well-established conditions under which interstitial hepatitis occurs, there are others which have been suggested, but which need much investigation and corroboration before they can be accepted as proven, however probable they may appear both from analogy and fact. George Budd,<sup>1</sup> over forty years ago, suggested that "there may be other substances among the immense variety of matters taken into the stomach, or among the products of faulty digestion, which, on being absorbed into the portal blood, cause, like alcohol, adhesive inflammation of the liver." Much more recently, in 1872, Botkin<sup>2</sup> advanced the hypothesis, that the acute infectious diseases may originate chronic inflammatory processes in the parenchymatous organs, because he had found in a number of cases commencing interstitial inflammation of the liver in persons dying of cholera or of typhoid fever. And Klein, in 1877,<sup>3</sup> described an acute interstitial hepatitis as present in eight cases of scarlatina which he had examined.

Now, although, so far as I am aware, no instance has been recorded in which cirrhosis of the liver was shown to be a *direct* sequence of scarlatina, cholera, or typhoid fever, yet, as it is established that in the kidney the poison of scarlet fever does frequently set up acute inflammation of the parenchyma and interstitial tissue which often becomes chronic, why may not the liver occasionally suffer a similar chronic inflammatory process? and what support is afforded to that view by this collection of cases? An analysis of the thirty-eight instances of cirrhosis of the liver contained in these tables, which cannot be referred to any of the established causes of that affection, shows that in nine instances the following acute infectious diseases preceded by a longer or shorter interval the cirrhosis; viz., scarlatina twice, measles and scarla-

<sup>1</sup> Diseases of Liver, 1845.

<sup>2</sup> Quoted by Thierfelder in Ziemssen's Cyclop., ix.

<sup>3</sup> Path. Soc. Trans., xxviii. 439.

tina once, measles alone four times, measles and pertussis thrice. In twenty-five instances no mention is made of acute infectious diseases as antecedent to the cirrhosis, and they were absent in three. The relative frequency of measles and of scarlatina in the above-mentioned nine cases was as 8 to 3; rickets once preceded the cirrhosis.

When the frequency with which the acute infectious diseases occur in childhood is borne in mind, it is plain that the above statements cannot be said to establish Botkin's hypothesis. Certainly, the infrequency with which hepatic cirrhosis obtains in children who have gone through the common infectious fevers is quite in contrast to the comparative frequency with which chronic nephritis follows scarlatina, and we need much stronger evidence than has been adduced to prove that the acute infectious fevers are causes of hepatic cirrhosis in children. However, an exception is admitted as already mentioned, in favor of intermittent fever or of malaria.

Even if it be granted that in the nine cases in which acute infectious fevers did precede the hepatic cirrhosis they really originated the interstitial lesion, there remain three in which those fevers had not occurred, and twenty-five in which no mention is made of them as having existed. For such examples of hepatic cirrhosis Budd's explanation is available and appears highly probable. Indeed, it is more especially in childhood when alcohol, as a cause of hepatic cirrhosis, can be, in a large proportion of cases, safely ignored, that we feel disposed to accept the view that the products of faulty digestion and certain stimulating kinds of food conveyed to the liver, set up interstitial hepatitis. It is well known that many of the lower animals (cow, pig, horse, deer, etc.) are subjects of hepatic cirrhosis. The fawns at Guy's Hospital to which the students from time to time gave linseed meal as a *bonne bouche*, died of cirrhosis of the liver.

It is impossible to bring much evidence in favor of this mode of causation from the cases that we are analyzing, owing to the absence of information as to the habits, diet, etc., of the patients. In the two cases observed by myself, the children habitually partook of the same kind of food as their parents, and that was at least of a stimulating character for children, the family being noted for the excellence of their cuisine.

Besides food containing articles more or less irritating to the liver, besides new products from faulty digestion, there is a class of bodies which were hardly known when Budd wrote his article, that may play a part in the production of interstitial hepatitis—such are the alkaloidal products of albuminous decomposition which have of late years been receiving attention—the ptomaines. Some of these may be the initiating cause of interstitial hepatitis. This subject has not as yet received much attention.



The age at which cirrhosis of the liver occurred in these children was

at birth	.	.	.	.	.	1	
" 3 months	.	.	.	.	.	1	
" 17 "	.	.	.	.	.	2	
" 20 "	.	.	.	.	.	1	} under 3½ years, 10
" 2 years	.	.	.	.	.	1	
" 3 "	.	.	.	.	.	2	
" 3½ "	.	.	.	.	.	2	
" 5 "	.	.	.	.	.	4	
" 5½ "	.	.	.	.	.	1	
" 6 "	.	.	.	.	.	2	} 5 to 8 inclusive, 13
" 7 "	.	.	.	.	.	3	
" 8 "	.	.	.	.	.	2	
" 8½ "	.	.	.	.	.	1	
" 9 "	.	.	.	.	.	5	
" 10 "	.	.	.	.	.	7	
" 11 "	.	.	.	.	.	7	} 9 to 13 inclusive, 28
" 12 "	.	.	.	.	.	5	
" 13 "	.	.	.	.	.	4	
" 14 "	.	.	.	.	.	1	
" 15 "	.	.	.	.	.	1	} 14 to 18 inclusive, 3
" 18 "	.	.	.	.	.	1	
Not stated	.	.	.	.	.	2	

According to this analysis the greatest liability in childhood to hepatic cirrhosis is from the ninth to the 12th year inclusive.

As regards sex, there were 35 males, 17 females, and in 4 other cases the sex was not stated. (The syphilitic cases are not included.)

Referring to the character of the cirrhosis in these 56 non-syphilitic cases, the atrophic form obtained in 19, the hypertrophic in 13; in 6 the organ was of its normal size; in 16 this point is not mentioned, and in 2 instances the patient was yet living when reported upon.

The symptoms of hepatic cirrhosis in children are identically those of the disease in the adult. I shall speak very briefly upon a few of them. In the two examples seen by the writer, there were present on the face stigmata composed of collections of dilated minute venules. Although they have been spoken of by some few authors, they are rarely alluded to in systematic descriptions of cirrhosis, and are mentioned but once in the records of the other cases, 61 in number, which I have collected and studied. Their presence should suggest an examination of the liver with special reference to the probable existence of cirrhosis.

The opinion commonly held by the profession is that cirrhosis of the liver is a non-febrile disease, yet in 10 out of 52 cases, uncomplicated by

other affections that might produce pyrexia, cirrhosis was associated with fever; that is, in 19.2 per centum. The same association obtained in 5 other instances in which either simple or tuberculous inflammation complicated the cirrhosis and may have produced the pyrexia. Dr. R. E. Carrington,<sup>1</sup> who has recently drawn attention to this circumstance, found an irregular febrile temperature present in 18 out of 44 cases of cirrhosis, or in 43 per cent. (This list includes seven children's cases.) It would not, however, be safe to conclude from these figures that cirrhosis is less frequently associated with a febrile temperature in children than in adults; for the records of many of these are altogether devoid of details on this point. Of these 10 febrile cases of uncomplicated cirrhosis, 4 presented the hypertrophic form, 4 the atrophic, and 2 had normal sized livers.

In the 56 cases of non-syphilitic cirrhosis, ascites existed in 34; it was absent in 8, and it was not mentioned in 14. It is interesting to note that in the 13 instances of hypertrophic cirrhosis ascites was absent but twice, not mentioned twice, and present, contrary to the opinions of some authors, 9 times. On the other hand, abdominal dropsy was absent in 4 out of 19 instances of atrophic cirrhosis, in which it is thought to be rarely wanting, present in 14, and not mentioned in 5 cases.

Icterus, more or less deep, was present in 23 cases, absent in 12, and not mentioned in 21 of the non-syphilitic group. These cases do not confirm Fagge's statement that where cirrhosis is associated with jaundice the liver is not contracted, as a rule, but is increased in size. For in the 13 hypertrophic examples jaundice was present 7 times, absent 3 times, and not mentioned 3 times; while in the 19 atrophic examples it was present 10 times, absent 4 times, and not mentioned 5 times. In other words, icterus coexisted with the hypertrophic form in 70 per cent., and with the atrophic in 71.4 per cent.

One point more and I have done. The fatal issue of hepatic cirrhosis in children is brought about in many different ways; but there are three especially frequent, viz., by toxæmia, or certain disturbances of the nervous system, by peritonitis, and by asthenia, in the production of which hemorrhage plays an important rôle. These three modes of termination obtained respectively in 12, 9, and 8 instances. Pneumonia seems to have been the immediate cause in 3 instances. The following affections held the same relation respectively in one instance: pleuritis, pulmonary congestion, tuberculous meningitis, ulceration of the entire colon, and "diarrhœa, with fits."

The toxæmic symptoms in these children, the subjects of hepatic cirrhosis, have been more especially violent fits of crying, and frequently of screaming, delirium, dilated pupils, stupor, tremor, twitchings, clonic

<sup>1</sup> Guy's Hospital Reports, vol. 42.

or tetanic convulsions, rigidity, coma and hemorrhages from stomach, nose, intestines, or kidneys.

In conclusion, it results from this analysis of these 63 cases of hepatic cirrhosis in children—

1st. That most of the established causes of the disease in adults obtain also in children, more especially the use of alcohol, present in 15.8 per cent. of the whole number; syphilis, chiefly hereditary syphilis, present in 11 per cent; tuberculous disease of other organs than the liver, in 11 per cent.; also, but much less frequently than these, venous congestion of the liver, peritonitis, and a general tendency to connective tissue formation in the system.

2d. That syphilis occasionally tends to a diffuse interstitial hepatitis or cirrhosis, by first inducing an adhesive inflammation of the portal vein.

3d. That a general arterio-capillary fibrosis is not proved by these cases to be the usual, and probably not even a frequent, cause of hepatic cirrhosis in childhood.

4th. That more than half of the cases of hepatic cirrhosis in children do not appear to be produced by the above-mentioned well-established causes of that affection.

5th. That there is some evidence that cirrhosis of the liver may be very exceptionally induced by the acute infectious diseases—cholera, typhoid fever, measles, scarlatina, but that proof of this is wanting.

6th. That the habitual use of a stimulating diet, or the absorption of the products of faulty digestion, are probably fruitful sources of hepatic cirrhosis in children.

7th. That it is in harmony with what is known of the causes of hepatic cirrhosis to believe that the bodies known as ptomaines may be capable of exciting a cirrhotic condition, and that investigation of this subject deserves attention.

8th. That the period of childhood most liable to cirrhosis of the liver is from the ninth to the fifteenth year inclusive, but that it may be congenital and may occur at any age after birth.

9th. That it is twice as frequent in male children as in female.

10th. That its symptoms are essentially the same in childhood as adult life.

11th. That it is frequently accompanied by pyrexia.

12th. That ascites or icterus, and frequently both together, are of common occurrence in the atrophic and the hypertrophic forms.

13th. That the group of symptoms which have been referred to cholemia or to cholesteræmia or to acholia, and even sometimes to uræmia, frequently ushers in the fatal issue of hepatic cirrhosis in children.

NOTE.—The author regrets not having had the opportunity of seeing a valuable article on “Infantile Cirrhosis,” published by M. le Dr. P.



Laure et M. Honorat, in the March (1887) number of the *Revue Mensuelle des Maladies de l'Enfance*, before having written this paper, as the French communication contains some original cases, as well as others published by previous writers, the works of some of whom he had been unable to consult, and of others he had overlooked. Dr. E. F. Marsh's case,<sup>1</sup> and Dr. Wesley M. Carpenter's comments<sup>2</sup> upon it, also escaped the author's notice. Dr. Carpenter has specimens of cirrhosis of the liver from children of four and seven years of age.

### ON THE THERAPEUTIC ACTION OF THE SULPHATE OF SPARTEIN.

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FICK and Raymond, the first experimenters on the action of spartein, one of the two principles contained in the broom, concluded that it acted chiefly on the nervous system. Sée,<sup>3</sup> in 1883, advocated its use as a therapeutic agent in cardiac diseases; stating that it strengthened the pulse as energetically as digitalis; that it was the best known regulator of the cardiac rhythms; that it quickens the heart's action in grave atonic conditions; that its effects are apparent in an hour or so after its administration, and last three or four days after it has been discontinued.

Laborde<sup>4</sup> and Legris confirmed the above views, stating also that spartein quickened a slow, but retarded an unduly fast pulse, and that the dose was from one and a half to three and three-quarters grains daily. These observers found that in animals the heart's beat was strengthened and slowed, and the quantity of urine increased. One and a half grains did not injure a dog of sixteen to eighteen pounds weight, but a dose of thrice this amount caused a tetaniform condition, with death from respiratory paralysis, the heart continuing to beat regularly. In the frog the heart continued to beat an unusually long time after death. They were inclined to think that the effect on the heart is produced partly by stimulation of the cardiac muscle, partly by stimulation of nervous centres.

Dr. Hans Voight<sup>5</sup> found that in small doses sulphate of spartein increases the energy of the cardiac contractions, and raises the arterial tension, with a corresponding diuretic action. At first respiration is

<sup>1</sup> Vide The Medical Record, N. Y., Dec. 19, 1885, p. 84.

<sup>2</sup> Ibid., Jan. 16, 1886, p. 66.

<sup>3</sup> Gaz. Hebdom., Nov. 1885, quoted in Med. Chron., Sept. 1886.

<sup>4</sup> Compt. Rendus Soc. de Biol., 1885, ii. 690, quoted in Med. Chron., Sept. 1886.

<sup>5</sup> Centralblatt f. d. gesammte Therap., Oct. 1886.

increased, but afterward somewhat lessened in frequency. There is often a slight narcotic action. Symptoms of intoxication, such as dizziness, headache, palpitation, and nausea, seldom occur after small doses (one-sixteenth to one-quarter of a grain), and pass off during the continued administration of the drug.

Gluzinski<sup>1</sup> found that the main effect of spartein consists, in a slowing of the heart's action, and in raising of the blood pressure more marked in cold-blooded animals. In mammals he distinguishes a first and third period of action, in which retardation is more marked than in the second period, when acceleration may even take place, and explains these phenomena by variations in the irritability of the pneumogastrics and of the cardiac muscle. Reflexes at first increased are subsequently lowered. Death occurs from asphyxia depending upon a lesion, not only of the medulla oblongata, but also of the respiratory muscles. He considers spartein inferior to digitalis in energy of action, but superior in rapidity.

The following observations were made on patients at the same time of the day in all cases, and with regard to meals and other circumstances, as far as possible, under the same conditions. For the tracings a Dudgeon's sphygmograph, that had been selected from several, and had been found previously to give accurate tracings, was used; and as the personal equation is no unimportant factor in sphygmographic tracings, I may, perhaps, say that I had had an extensive experience in taking them before. For the quantity of the urine, since these observations were made on out-patients, I had to depend on their statements, and therefore the most intelligent of the patients were selected for this purpose, especially in those cases in which the amount of urine was estimated.

The most important actions of spartein are to strengthen the cardiac beats, to raise the arterial tension, and to regulate the pulse, and its action appears to differ in some respects according to the dose given. When given by the mouth the first beneficial effects begin to be apparent in nearly all cases about thirty minutes after it has been swallowed, in some not till forty-five minutes after. The effect of individual doses (one-sixteenth to one-quarter of a grain) lasts for about four or five hours, of larger doses (one to two grains) somewhat longer, and gradually pass off. When it has been taken regularly for some days or weeks the effect lasts from three to four days, or even six days after its administration has been discontinued in cases that are not permanently relieved. In a few of the cases given below, the effect, from reasons I could not discover, was not so protracted, passing off with the discontinuance of this remedy. The doses employed varied from one-sixteenth of a grain every four hours

<sup>1</sup> Fezegad de karski, No. 1, 1887, and Vrach, No. 3, 1887.

to twelve grains in the twenty-four hours, no toxic effects of even the slightest severity were produced, and there was no evidence of accumulation in cases where the remedy was taken for from three to four months continuously.

The first effect, coming on about thirty minutes after exhibition of the dose, consists in a strengthening of the force of the heart-beats, with a slowing and regulation of the pulse in cases where this is abnormally rapid. Closely following on this, at about forty-five minutes or one hour after the dose, the arterial tension is raised, and shortly before this rise of tension, or at the same time, the surface of the skin becomes red, flushed, and moist, with, in some instances, free perspiration. During the next two or three hours, for the first part of the time, the surface of the body remains flushed and warm, the arterial tension continues to rise, or to remain at a higher level than before the dose, and the rate of the pulse to be slowed until it reaches or approaches the normal, while from the first the heart beats with increased force; the patient, meanwhile experiences a marked sense of well-being and of comfortable warmth, with, if it existed, loss of præcordial distress, irregular cardiac action, and dyspnœa. Now it seems to me that this rise of arterial pressure, with increased amount of blood sent through the skin (and kidneys), can only be explained in one way, by a special action of spartein on the medullar vasomotor centre, this centre by causing contraction of the vessels of the splanchnic area, and so diminishing the amount of blood sent through the great splanchnic vessels raises the blood-pressure, and, at the same time, an increased amount of blood is driven through the vessels of the skin and kidneys. This increased cutaneous blood-supply will be sufficient to explain the moistening of the skin that takes place, but where free sweating occurs, I think, we must also suppose a stimulation of the secreting cells of the sweat-glands by the drug.

Sparteïn also causes a variable increase in the amount of the urinary secretions, with increased excretion of urea, in correspondence with the increase of water, and this diuretic action we should anticipate as a consequence of the strengthened *vis a tergo*, the rise of blood-pressure, and the increased quantity of blood passing through the kidneys. This flushing of the surface was a constant result, except in a few cases. On respiration sparteïn produces an initial quickening, followed by a slowing, reaching or approaching to the normal rate, at the same time the respiratory movements are of greater depth.

Now some minor modifications of the above statements require notice. First, as in Gluzinski's observations, quoted above, in some cases the division of the action of sparteïn into three periods, an initial, and later one, of slowing of the pulse and respiration, with an intermediate period of quickening, was noticed; this effect occurred about seventy-five to



ninety minutes after the dose was taken, and in only two or three patients; it was especially marked in a case of aortic regurgitation.

Secondly, the best results, in all respects, were obtained when the dose was given often; every four hours appeared the most satisfactory arrangement. Then small and large doses have a somewhat different effect, and this explains some of the discrepancies in the statements of the observers above quoted. Small doses, one-sixteenth to one-twelfth of a grain, produce the maximum effect in the regulation of the pulse. In one instance doses of one-tenth of a grain rendered a previously arrhythmic pulse quite regular when large doses had failed to do so, and I had frequent occasion to note the same result. These small doses were also best for relieving palpitation, and for quieting down violent cardiac pulsation; small amounts also appeared to strengthen the force of the heart-beats, with very little raising of the arterial tension, and the stimulating cardiac action, combined with small increase of tension, will be doubtless of great service where it is important to strengthen the force of the heart-beats without increasing markedly the peripheral resistance. Larger doses, one to two grains, powerfully increase the force of the beats, but, at the same time, even more powerfully raise the arterial tension, and as an effect of this I found, in many cases, violent pulsation produced, with præcordial pain, and a strong but very tense pulse.

When the drug is taken regularly for some time, the general effect, apart from that of each individual dose, is found often to be an acceleration of the pulse and respiration-rate, giving way, after the first day or days, to a subsequent slowing.

As to accumulation, an overdose, taken for some time, appears to produce very high tension of the pulse, and, as in the case of mitral stenosis, "tightness of the chest," with sharp cutting pains and throbbing over the heart; in another case, after spartein had been taken for two months continuously, the previously rapid pulse was slowed to fifty beats in the minute; but this was in an elderly man, and accompanied by a sense of increased strength and well-being, with relief of dyspnoea, etc. These were the only two cases in which I could at all obtain any evidence, although I was constantly on the lookout for it, of toxic effects.

As to the other evidences of intoxication mentioned above, nausea occurred in a few cases, but soon passed off; palpitation and præcordial pain certainly result from too large a dose, due probably to the beat laboring against an excessive peripheral resistance, but these symptoms are not produced by smaller doses.

Cough was generally relieved, owing probably to increased depth and regularity of respiratory movements; dyspeptic pains also often disappeared. This I attributed to the improvement of the circulation.

It remains to be said that in cases where the left ventricle is much hypertrophied, or when, from any cause, the heart is beating too violently, spartein quiets and diminishes the force of its action; also that in some instances of abnormally slow pulse, spartein quickens the rate until it reaches or approaches the normal, and finally, that when the arterial tension is already very high, its action is spent in strengthening the heart-beats.

The foregoing seems to lead to the conclusion that spartein belongs to the digitalis group, and acts directly on the cardiac muscle and the cardio-inhibitory centre in the medulla, thus giving rise to increased force of cardiac contractions, and through the pneumogastrics to regulation of the pulse, generally in the direction of slowing; in cases, however, in which the pulse is abnormally slow, the drug often accelerates it. A general rise of arterial tension takes place, partly as the effect of the increased force of the heart-beats, but probably chiefly due to a stimulation of the medullary vasomotor centre causing contraction of the vessels of the splanchnic area, with therefore an increased blood supply to the skin and kidneys. This seems to me the only way in which to explain a general rise of blood-pressure, with, at the same time, a vastly increased quantity of blood driven through the cutaneous vessels. The correlation of skin and kidneys in normal function lends itself to the supposition that at the same time more blood is passing through the renal vessels, thus causing increased excretion of urine. The more marked diuresis produced by larger doses may be due to stimulation of the renal cells, as in the case of digitalis, according to many observers. The quantity of urine is not, however, invariably increased, perhaps in relation with the free diaphoresis produced by spartein in some patients. No effect on the temperature was noted. Tracings from three cases are here given.

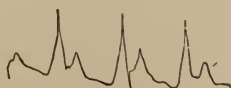
The following tracings<sup>1</sup> were taken at short intervals of time after spartein had been administered.

CASE I.—A bad case of mitral regurgitation in a youth of nineteen. The chest was bulged out over the præcordial area, and the area of cardiac dulness was bounded above by the third rib, on the right by the right

TRACING 1.



TRACING 2.



border of the sternum, and extended beyond the nipple. The apex beat was one inch outside the nipple in the fifth space.

<sup>1</sup> Pressure three and a quarter ounces in all tracings.

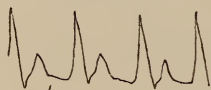
Tracing No. 1. Pulse 120, almost hyperdicrotic; respiration 24; face and lips very livid. Spartein sulph. one-quarter grain administered at 12.45 P. M.

At 1 P. M. there was no change in character of pulse tracings. Pulse 120; respiration 24.

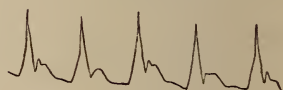
Tracing No. 2. 1.30 P. M. Pulse 90; respiration 24; much less lividity of lips; slight rise of tension.

Tracing No. 3. 2 P. M. Pulse 84; respiration 22; blueness of lips had disappeared; the skin everywhere was now warm and moist, instead of cold as before. A tracing at 2.30 P. M. showed a further rise in tension.

TRACING 3.



TRACING 4.



Tracing No. 4. 3.15 P. M. Pulse 84; respiration 20; no lividity; surface of body still warm.

The improvement in appearance was now striking from flushing of the surface. He improved somewhat for three or four weeks, but then made no further advance; the rapidity and violence of the cardiac beats, shortness of breath, etc., increased. The dose of spartein was raised gradually from one-twelfth to one-fourth of a grain, every four hours, without effect. He died after being in bed for one month. Digitalis and other remedies were tried without any benefit.

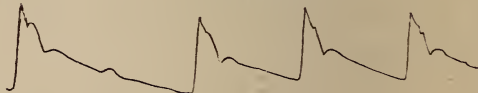
The following tracings are from a case of mitral stenosis.

Tracing No. 5 was taken before administration of spartein. Pulse 72; respiration 18.

TRACING 5.



TRACING 6.



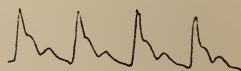
Tracing No. 6 was taken after spartein, one-sixteenth of a grain, had been given every four hours for four days.

The next two tracings are from a case of Graves's disease.

TRACING 7.



TRACING 8.



Tracing No. 7 was taken before the administration of spartein. Pulse-rate was 132; respiration 36.

Tracing No. 8 was taken after sulphate of spartein, one-half grain, had been taken three times a day for five weeks. Pulse 76; respiration 18.



Of ten cases of mitral regurgitation, due in seven to rheumatic fever, in one to endocarditis following chorea, in the other two patients to anæmias associated with violent palpitation, eight were completely relieved, and in the two anæmic patients the murmur disappeared, so that it was probably due to relative incompetence from dilatation of the left ventricle. The two cases that did not improve were very bad ones, and were afterward treated by digitalis, and other measures, without any benefit. The quantity of urine and of urea excreted was increased in six patients. Dyspnea and præcordial pain appeared to be relieved first, followed by the disappearance of œdema in the most speedy instance after three days' treatment. An increased feeling of well-being was noticed by all, at first even by the two patients in whom the cardiac symptoms were not ameliorated. The pulse was rendered less frequent, stronger, and more regular.

In two or three instances it was found that a small dose, one-sixteenth of a grain, given at intervals of three or four hours, produced the greatest regulating effect on the pulse, and relieved arrhythmia where larger and less frequent doses had previously failed to do so. A study of these cases and of others shows that spartein is likely to be of great service in mitral regurgitation, relieving the symptoms in most instances rapidly and completely.

In mitral stenosis we may expect good results when the pulse is small, weak, and irregular, but in this form of heart disease the effect produced by it seems of shorter duration, and more immediately dependent on the continual administration of the drug. Though the patients improved whilst taking it, the good effects ceased on leaving it off. Four out of five cases of mitral stenosis to whom I gave it improved, however; one being able to lie down at night, which had been impossible for three years before.

In one woman, after taking one grain every six hours for three weeks, sharp cutting pains at the left shoulder-blade and over the heart came on, with a feeling of tightness in the chest. These symptoms ceased on reducing the dose.

In aortic regurgitation, when the violent pulsation of a greatly enlarged heart produces much pain and distress, spartein is a valuable remedy, quieting and regulating the excited cardiac action without unduly prolonging the systole; in these cases tracings showed that the excessive force and rapidity of the heart-beats were lessened, *pari passu*, with a gradual fall in the arterial tension. Small doses were here most beneficial. In other forms of hypertrophy it will be found useful when the heart acts violently and irregularly. In the hypertrophy combined with extremely high tension of chronic Bright's disease the effect was to stimulate the cardiac contractions, while the arterial tension was not further raised nor the quantity of urine increased.

In a number of patients suffering from various forms of chronic lung disease with obstruction to the pulmonary circulation, and where compensatory changes had not been established in the right heart, or after being established had broken down, I found spartein of great value; dyspnœa, præcordial pain, and palpitation were relieved almost at once, and in several a cough grew less. In two cases, where there was reason to suspect fatty or other changes of malnutrition in the heart-muscle, no benefit was noted.

Of five cases of asthma, four were entirely relieved, the other was not benefited. The administration of spartein was combined with inhalations of pyridin; improvement was slow, all being under treatment from one to five months. The severity of the symptoms was very much diminished, the attacks cut short, and rendered less frequent after a short time, one to two weeks, and the patients could keep comfortable whilst they continued the drug, but if they left it off were liable to relapse. Gradually the attacks returned less and less often and became milder, and finally ceased at the end of the winter; so that the ultimate effect in four out of five cases was satisfactory, though the slow progress was disappointing after the enthusiastic statements that have been made as to the value of spartein in asthma. In one old man suffering from asthma and chronic bronchitis the pulse-rate, that had previously been 96-84, was slowed to 50 in the minute, and was rendered more forcible. This slowing took place after two months' continuous administration of the drug, and though accompanied by marked amelioration of general symptoms, must be, perhaps, regarded as due to accumulation.

In cases of palpitation, without evidence of organic heart disease, spartein gives immediate relief, which becomes permanent after the remedy has been continued for a week or two. In chlorosis, with dilatation of the heart and the usual murmurs, I found that spartein, given in combination with iron, quickly relieved palpitation, pain, dyspnœa, and œdema of the ankles, and in due course the murmurs and the evidences of dilatation when present disappeared.

The effects of spartein in three cases of Graves's disease were remarkable, and if a wider experience confirms them, it will be a valuable remedy in this disease. In two of the cases the usual remedies, including a long course of arsenic, and the passing of a constant current through the neck, etc., had been tried without effect. On giving spartein the pulse-rate dropped in one week from constant rates of 132 and 136 to the minute, to rates of 72 and 84 respectively, the coincident throbbing and pulsation of the thyroid and of the great vessels of the neck ceased. Other symptoms were relieved, especially the nervousness and weakness previously complained of, and the size of the thyroid tumor distinctly diminished. The gain in strength and general well-being, with improvement of appearance due to gain of flesh and color, was striking.

In the third case, a more severe example of the disease than either of the preceding, there was general improvement, with diminution of violent pulsation in the thyroid and over the neck and face, but the pulse-rate of 144 was not reduced to less than 96 to the minute, varying between this and 108. This patient suffered from continual fine tremor of the muscles, especially in the limbs; while taking spartein this tremor remained absent, but returned if the drug was left off. She has improved in strength and feels well whilst she is taking it. She has now been taking one-quarter of a grain ever four hours for six months.

I gave spartein for periods varying from two weeks to six months in daily quantities of one-third of a grain to twelve grains, the latter large dose was continued in one case for a month with benefit. It is best to begin with one-sixteenth of a grain every four hours, and gradually increase up to two grains, if necessary until the desired effect on the circulation is obtained. When the dose is given less frequently the result does not seem so good; sometimes a large dose may be gradually reduced without loss of effect. There is no fear of accumulation. The signs of an overdose are palpitation, præcordial pain, small, rapid pulse of high tension, and a feeling of great weakness, or even trembling.

Spartein begins to act in about thirty minutes after it has been taken by the mouth, and its action lasts from about five to six hours. This rapidity of action, at first consisting in a stimulation of the heart, rise of arterial tension not occurring until a little later, indicates the use of spartein in asystolic conditions of valvular disease, where a speedy effect is desired, giving it superiority over more slowly acting drugs.

In these conditions, too, a small dose should be employed (one-sixteenth to one-quarter of a grain), since in these doses spartein seems powerfully to stimulate and regulate the heart with the smallest rise of arterial tension, perhaps not more than is the normal accompaniment of increased cardiac force.

Diuretic effect is most marked with fairly large doses, half a grain to two grains; with small it is not so evident, but is often present. Flushing of the surface of the body occurred in from one to two hours after administration in most cases.

## THE CARDIAC RELATIONS OF CHOREA.

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THE heart symptoms of chorea demand special consideration as among the most important and peculiar features of the disease. Chorea is rarely a fatal disease in children, and hundreds of cases may be treated without



a death. By far the most serious fact in the clinical history of the disease is the occurrence of endocarditis; but here the danger is remote, not immediate, and lies in the changes which an acute valvulitis may initiate.

A satisfactory study of the cardiac relations of chorea must embrace the condition during the attack, and the subsequent heart history after a period of years. The first question has engaged the attention of many workers, and an attempt is here made to work out the second on a scale not hitherto attempted.

### I. CONDITION OF THE HEART DURING THE ATTACK.

Oftentimes the extreme jactitation renders the examination of a choreic child difficult or even impossible. I make it a rule to examine the bare chest. Auscultation through the clothing is not trustworthy, as soft murmurs, readily audible with the stethoscope, may easily escape detection. It is a good plan to let the child lie quietly on a lounge for some time, and make the first examination in the recumbent position when the heart's action is less rapid. Subsequently the effect of exercise and of the erect posture may be tested.

In chorea, as in rheumatism, the evidences of cardiac disease must be sought for, as it is rare to hear complaints of either palpitation, pain, or other symptoms which would direct attention to the heart.

The cardiac disturbance is indicated by the presence of murmurs, alteration in the rate or rhythm of the heart's action, and by pain.

A murmur at one or other of the cardiac areas is by far the most common sign and is present in a considerable number of all cases. Of 410 cases in the records of the Infirmary for Nervous Diseases, there were 120 which presented a heart murmur at the time of examination. In at least 40 cases there was either no note or an imperfect one, and in very many the exigencies of out-patient work prevented a very thorough examination. It can safely be said that in over one-third of the cases a heart murmur was detected, and I have no doubt that this number would have been much increased had each child been stripped and special attention given to the auscultation of the heart.

Of the 120 cases, 113 presented the apex systolic or mitral murmur, in 7 a basic, and in 3 both apex and basic. In 15 cases the heart's action was noted as rapid, and in 6 as irregular. Pain was not a frequent complaint and was noted in only 6 or 7 cases.

It is common experience that the special indication of heart trouble in chorea is the presence of a soft systolic bruit, heard best at the apex or over the body of the ventricles and not often propagated to or beyond the mid-axilla. Basic systolic murmurs are usually associated with anæmia or debility. Diastolic and presystolic murmurs rarely, if ever, occur in acute chorea.

Before discussing the probable nature of these murmurs it will be well to study the anatomical condition of the heart in fatal cases. Fortunately these are rare. I have inspected three cases.

CASE I.—S., a girl, aged eleven; had had acute rheumatism. Admitted to the Montreal General Hospital, under Dr. George Ross, with acute chorea, and died of an intercurrent pneumonia. The movements had almost ceased under hypodermics of arsenic. The autopsy (No. 465 post-mortem records Montreal General Hospital) showed slight hypertrophy of the heart, somewhat thickened mitral curtains with numerous irregular warty vegetations just inside the auricular margins. Two of the aortic segments also presented bead-like vegetations below the corpora Arantii.

CASE II.—T. B., a boy, aged eleven, had chorea in May, 1880, and a second severe attack in July of the same year. No rheumatism. No heart murmur. About the 20th of February, 1881, there was a recurrence, and on March 3d he again came to the general hospital to see Dr. Molson. About the 10th he began to get feverish and extremely restless. On the 14th the temperature rose above 104° F., and he became comatose. The left arm seemed powerless, the right arm and leg were constantly twitching. On the 15th the temperature reached 105° F., and there were cutaneous ecchymoses. He died on the morning of the 16th. The autopsy showed very extensive mitral valvulitis, the vegetations large, soft, grayish-white in color. No chronic affection of the valves. The spleen and kidneys contained many recent infarcts. The brain and membranes healthy, with the exception of a spot of grayish-red softening in the right corpus striatum (lenticular nucleus) about the size of a cherry. It was no doubt embolic, though the arteries of the perforated space were carefully examined for emboli without success.

CASE III.—Emma M., aged eighteen, admitted to the Montreal General Hospital, under Dr. George Ross,<sup>1</sup> and died in five days of exhaustion. There was no rheumatism, and the attack had followed a fright five days before admission. Here, too, the only important lesion was on the mitral valves—a row of soft warty vegetations on the auricular face just within the free margins.

The statistics of fatal cases of chorea have been collected by Sturges<sup>2</sup> and Raymond.<sup>3</sup> Of eighty cases, representing the combined experience of Guy's, Bartholomew's, St. George's, and St. Thomas's Hospitals, Sturges states that there were only five with the heart valves and pericardium reported healthy.

Excluding the London cases from Raymond's table of 79 cases, there are left 34, in only 19 of which there were specific statements as to the condition of the heart, and in every one of these endocarditis was present. I have found the reports of 15 additional cases,<sup>4</sup> which, with the three

<sup>1</sup> Canada Medical and Surgical Journal, vol. xi.

<sup>2</sup> Chorea. London, 1881.

<sup>3</sup> Dictionnaire encyclopédique des Sciences Médicales.

<sup>4</sup> Mackenzie (Trans. Inter. Med. Congress, 1881), six cases, five of endocarditis. Donkin and Hebb, 1 case, valves normal (Med. Times and Gaz., 1884, ii.). Baxter (Brain, vol. ii.) one case. Morell-Lavellée (Revue des Maladies de l'Enfance, 1884), one case. Frank (Allg. Wiener med. Zeitung, 1879), one case. Maixner (Med.-Chir. Centralblatt, Wien, 1882), one case. Koch (Deutsches Archiv f. klin. Med., Bd. xl.), four cases.

here given makes 18, in 16 of which there was mitral endocarditis. We may say that of 115 fatal cases of chorea, with notes of the state of the heart, in not more than 10 was this organ found normal, and in the great proportion of the cases the lesion was acute mitral valvulitis.

One other point must be considered before we speak of the nature of the heart murmur. In what proportion of the cases is there a history of rheumatism? In 35 of the 120 cases, 29.1 per cent., there was a note of articular affection, either acute or subacute, or of pains which might be regarded as rheumatic.

Much has been written in explanation of the heart murmur of chorea; an idea of how much may be gathered from the fact that a discussion of the theories which have been advanced occupies twelve pages in Hayden's work on *Diseases of the Heart*. We are concerned chiefly with the apex systolic murmur, universally recognized as the most frequent and characteristic sign of implication of the heart in chorea. Speaking generally, we meet with such a murmur in mitral endocarditis, or in relaxation of the ventricular walls, such as occurs in anæmia and fevers, and it is attributed to regurgitation through the mitral orifice, owing either to absolute insufficiency, in consequence of the endocarditis, or to relative insufficiency when the normal valves are unable to close an orifice enlarged as a result of relaxation of the heart muscle. In chorea a special theory of musculo-papillary spasm has been advanced to account for the mitral murmur.

It would be fruitless to re-discuss, in all its aspects, a subject so well and ably presented in various works, particularly in those of Hayden and Sturges. That there is such a condition as spasm of the papillary muscles resulting in a "want of correspondence between the fibres of the ventricle, which obliterate the cavity and those which close the valve," is a plausible hypothesis unsupported, so far as I know, by any clinical or anatomical facts, while the general immunity of involuntary muscular organs in chorea speaks strongly against it.

Sturges thinks that there may be a fatigue paresis of the papillary muscles, similar to that which sometimes involves the limbs, and this weakness and relaxation prevent accurate adaptation of the valve segments. He urges in support the inconstant character of the murmur, appearing and disappearing without apparent cause, and states that it may be synchronous both in its time of arrival and duration with the paresis of the voluntary muscles. I have not been able to trace any such connection, nor have I found in the paretic cases any special tendency to variability in the murmur. Indeed, so far as my experience goes, the *apex* systolic bruit of chorea is by no means an inconstant murmur. If muscular incompetency has anything to do with the production of the choreic bruit, it is more likely to be of a similar character to that which occurs in anæmia, debility, and fevers. Here it is the relaxation of



the walls, and particularly the so-called mitral muscle, which induces a condition of relative insufficiency of the segments and permits of regurgitation. There may be in chorea, as is well known, a high degree of anæmia, and in a certain proportion of the cases this explanation of the murmur may hold good, but in the great majority of instances the bruit is detected early when there is neither anæmia nor debility.

I am strongly of the opinion that the apex systolic bruit of chorea is, in at least nine out of ten cases, associated with endocarditis:

1. The extraordinary frequency with which mitral valvulitis is met with in fatal cases. *There is no known disease in which endocarditis is so constantly found, post-mortem, as chorea.* As the figures above quoted show, it is exceptional to find the heart healthy. I do not know of statistics of any very large number of fatal cases of acute articular rheumatism to place beside these figures, but I doubt if even this disease, so prone to endocardial complication, can be compared with chorea in this respect. Dickinson has raised the question whether these beads of fibrin are not rather the consequence than the cause of the valvular defect, and Sturges holds that this appearance does not represent a true inflammation of the endocardium. Whether a true inflammation or not, I think it must be conceded that the lesion is identical, microscopically as well as macroscopically, with simple or warty endocarditis as we see it in other diseases.

2. The character and location of the murmur are such as experience in other affections has taught us are associated with inflammation of the mitral segments. I speak of the apex bellows-murmur. Why this should be so generally associated with the presence of a row of small warty vegetations just within the auricular margins of the curtains, not, one would think, seriously interfering with their functions, is a problem to be solved. The condition certainly does not necessitate regurgitation, and the bruit may perhaps, as has been suggested, be due to friction of the roughened faces of the segments.

3. The inconstancy of the murmur and its disappearance on the subsidence of the chorea have been urged against this view. Now we must acknowledge that the bruit may be variable and, indeed, does not necessarily accompany mitral endocarditis. Kirkes, years ago, insisted upon this, and there have been two autopsies in carefully studied cases of chorea in which the vegetations were found post-mortem, and careful examination failed to reveal a murmur (Baxter: *Brain*, vol. ii.; *Frank. Allg. Wiener med. Zeitung*, 1879.) The facts which I shall subsequently give suggest that we may during the attack have an endocarditis, not manifest even by a murmur, but which has laid the foundation of future trouble. The disappearance of the apex murmur of chorea—and of rheumatism too—has been repeatedly followed, and if caused by the small vegetations, this is a natural sequence of the changes which go on

in them. At first a soft granulation tissue, they become in time firmer, smaller, and ultimately smooth flat elevations mark the spots. It is not improbable that if we could follow accurately the auscultatory history of a valve affected with acute endocarditis, we should find in many cases that the murmur of the fresh attack disappeared, to reappear when the changes, which it is the misfortune of the acute disease to initiate, have reached a point of interfering with the competency of the valve.

4. In its sequel the cardiac affection of chorea has been supposed to differ from that of other diseases, "as none of the injurious after-consequences which attend endocarditis in its other relations . . . are found to ensue here" (Sturges). A study of any large number of choreics some years subsequent to the disease tells, as I shall show, a sad tale to the contrary and proves that the primary heart trouble is, in a majority of cases, at least, endocarditis.

## II. THE CONDITION OF THE HEART IN CHOREIC PATIENTS SOME YEARS AFTER THE ATTACK.

Owing, doubtless, to the difficulties inherent to such an investigation, this line of inquiry has not been followed by many workers. Indeed, so far as I know, Dr. Stephen Mackenzie's paper, at the London International Congress, is the only one which has dealt with the subject, and he has examined thirty-three patients at periods from one to five years subsequent to the attack. Postal cards were sent to all the choreic patients, in sets of twenty-five, who had been in attendance at the Infirmary since 1876, asking them to return for the purpose of having the heart examined. One hundred and ten came back, a number much exceeding our expectations.<sup>1</sup> All the more recent cases in attendance at the clinics have been excluded—all, indeed, after March, 1885, so that the study is based upon 110 cases in which the examination was made *more than two* years subsequent to the attack of chorea. In each case, as it came, reference was made to the original notes, questions asked concerning subsequent attacks, and rheumatism, and the heart examined in the recumbent and erect postures, at rest and after exertion.

The results summarized, are as follows: In 43 cases the heart was normal, in 54 there were signs of organic disease, and in 13 there was functional disturbance.

The tables which I have prepared are too full for publication, but the following abstracts of the cases affected will be of interest:

1871 (sixteen years). Two cases.

CASE I.—Laura C. R., aged twenty-five. Several attacks subsequent to 1871. Never had rheumatism until February, 1887. No note of

<sup>1</sup> It speaks well for the stability of the artisan class in Philadelphia that so many of the postal cards reached their destination. Comparatively few were returned from the Post-office with the comment—*Removed; cannot find.*

heart condition in previous attacks. Has attacks of shortness of breath. *Status præsens*: Impulse is forcible. Dulness increased. Apex systolic murmur heard to posterior axillary fold. Second left accentuated.

CASE II.—Kate L., aged twenty-one. Two or three attacks after 1871; bad one in 1878. In 1882, had inflammatory rheumatism, never any joint trouble before this time. In 1878, note is "impulse strong; apex murmur." She has had attacks of shortness of breath. *Status præsens*: Feeble thrill; localized purring presystolic murmur. Loud apex systolic transmitted to posterior axillary fold. Second left accentuated.

1872 (fifteen years). One case. No heart affection.

1874 (thirteen years). Three cases.

CASE IV.—Annie M., aged twenty-five. Second attack in 1883, third in 1885. Had rheumatism just before the first attack. No note of heart in first or second; in 1885, an apex systolic murmur. *Status præsens*: Loud apex systolic transmitted to axilla; second left accentuated; transverse dulness increased; impulse forcible.

CASE V.—Bertha G., aged twenty-five. A second attack in 1880. No rheumatism. In 1880, a soft systolic murmur. *Status præsens*: Impulse not forcible. Loud apex systolic murmur propagated to axilla. Very ringing and accentuated second left. Has palpitation and attacks of shortness of breath.

CASE VI.—Charles M., aged twenty-eight. Second attack in 1880. Had pains in joints before second attack. No note of heart. Is strong and well, no subjective symptoms. *Status præsens*: Soft apex systolic murmur, not heard in axilla or in pulmonary area. No increase in dulness. Second left accentuated.

1875 (twelve years). Two cases; one normal.

CASE VII.—Hester G., aged twenty. Original attack very severe; a second in 1879, and one since. No rheumatism. No note of heart in attacks. For two years has had attacks of palpitation and dyspnoea. *Status præsens*: Impulse forcible. Presystolic thrill; rough presystolic murmur. Loud accentuated second left.

1876 (eleven years). Eight cases; one normal.

CASE IX.—Annie T., aged seventeen. Since 1876 three attacks, last in 1885. No rheumatism. In 1885, a soft systolic murmur. Complains that she does not lie comfortably on left side. *Status præsens*: Impulse forcible, outside nipple. Apex systolic loud, heard well in axilla. Second left accentuated.

CASE X.—Robert P., aged twenty-one. Second attack in 1879. No rheumatism. No previous note of heart. *Status præsens*: Action rapid, impulse diffuse. Dulness not increased. Blowing systolic murmur just above apex, not heard in axilla; disappears on exertion. Second left accentuated.

CASE XI.—Lizzie H., aged sixteen. Many attacks since 1876, two of them severe. Had rheumatism when four years old. In 1878, second left was reduplicated. *Status præsens*: No evident enlargement of heart; impulse feeble; no thrill. At apex double murmur, presystolic short, not rough. Systolic not loud, not transmitted to axilla. On



exertion louder. Both very distinct. Second left very loud. Has occasional attacks of palpitation.

CASE XII.—Ida L., aged eighteen. Three attacks since 1876. No rheumatism. No note of heart in 1879. No symptoms. *Status præsens*: Beat forcible; dulness increased. Loud apex systolic murmur, heard at angle of scapula and very distinct along left margin of sternum. At aortic cartilage a soft systolic bruit. Second left ringing and accentuated.

CASE XIV.—Jennie A., aged twenty. Second attack in 1878, third in 1879. No rheumatism. In 1879, sound, stated to be normal. *Status præsens*: Impulse not forcible, no apparent enlargement. In fourth left space a rough presystolic murmur; limited in area. At apex a systolic bruit, transmitted to axilla, and heard at angle of scapula. Second left very accentuated. Sounds at apex booming. No symptoms, always good health.

CASE XV.—Annie L., aged twenty-four. Two attacks since, last one in 1882, when for the first time she had rheumatism. No note of heart. *Status præsens*: Apex an inch outside nipple. Impulse forcible. No thrill. Presystolic murmur, not rough, in fourth space; apex systolic, heard in axilla and at angle of scapula. Loudly accentuated second left. Has had palpitation and shortness of breath on exertion for three years.

CASE XVI.—Miriam C., aged nineteen. Two attacks since. Never had rheumatism. Has had heart disease for some years; is now in bed with it.

1877 (ten years). Seven cases; three affected.

CASE XVII.—Andrew G., aged twenty-one. The attack followed acute rheumatism. In 1878, a soft systolic murmur. No symptoms. *Status præsens*: When recumbent sounds clear. Erect and after exercise well-marked apex systolic, not transmitted. Second left ringing, accentuated, and reduplicated. No enlargement of the heart.

CASE XX.—Mamie L., aged fifteen. Rheumatism (acute) four weeks before onset of chorea in 1877. No attack since. In 1877, "mitral murmur." No symptoms. *Status præsens*: Impulse forcible, beat outside nipple line. Transverse dulness increased. Loud apex systolic murmur, propagated to posterior axillary fold. Second left very accentuated.

CASE XXIII.—Rose McF., aged twenty-four. Attack in 1877 prolonged and severe; none since. No rheumatism. In 1877, a faint apex systolic murmur. *Status præsens*: Heart's action violent; impulse forcible; apex outside nipple. Marked presystolic thrill. Presystolic murmur in fourth interspace. Systolic murmur in fifth space, and heard as far as posterior axillary fold. Second sound accentuated at the second left cartilage, and also heard loudly in axilla. Patient is at times very short of breath; has attacks of palpitation and has fainted.

1878 (nine years). Two cases; one affected.

CASE XXIV.—Minnie C., aged fifteen. Attacks also in 1879, '80, and '85. Rheumatism in 1885, never before. In 1878 an apex systolic murmur. No symptoms. *Status præsens*: Impulse forcible; apex outside nipple-line; transverse dulness increased. Apex systolic murmur

heard to posterior axillary fold. Double murmur at aortic cartilage; diastolic heard also on sternum. Second left not accentuated.

1879 (eight years). Four cases; all affected.

CASE XXVI.—Fannie N., aged fifteen. Second attack in 1885. Has had rheumatic pains, but no swelling of joints. In 1879 had pain about the heart, and since then has had occasional attacks of palpitation on exertion. *Status præsens*: Impulse in fifth a little out. Transverse dulness increased. Presystolic thrill, most marked at apex. Rough presystolic murmur at and just above the apex. Soft systolic at and outside apex beat. Second left much accentuated, and is also very ringing and loud in axilla and at angle of scapula.

CASE XXVII.—Lizzie R., aged twelve. Three subsequent attacks, 1880, '83, and '86. Those of 1879, '80, and '83 very severe. No rheumatism. No previous note of heart condition. Has had no heart symptoms. *Status præsens*: Forcible, diffuse impulse. Apex a little outside nipple. Systolic murmur at apex transmitted to axilla and heard feebly at angle of scapula. Second left very accentuated.

CASE XXVIII.—Rose F., aged thirteen. Second attack in 1881. Heart normal in 1879. Has been short of breath, particularly on exertion. *Status præsens*: Impulse strong. Transverse dulness increased. Rough presystolic thrill. Very rasping presystolic bruit. Maximum intensity in fifth, just within nipple. Second left accentuated and reduplicated. Aortic sounds feeble.

CASE XXIX.—Mary G., aged thirteen. Several attacks since 1879; in 1885 a bad one, and now, May, 1887, is in infirmary with a severe attack. Rheumatism in 1885 with chorea, not before; and this time has had swollen joints. In 1885 had systolic apex murmur. *Status præsens*: Impulse in fifth and sixth, outside nipple. Dulness increased. Loud apex systolic bruit propagated to axilla and scapula. Second left much accentuated. Has had attacks of cardiac dyspnoea in which she could not lie down. At times severe pain at heart.

1880 (seven years). Five cases; three affected.

CASE XXXII.—Ellen McG., aged twenty-three. No rheumatism. No note of heart in 1880. Is anæmic; has palpitation, shortness of breath, and at times severe pain at heart. *Status præsens*: Action rapid and forcible; dulness increased. Presystolic thrill all over mitral area. Rough presystolic murmur. Soft systolic bruit just outside apex. Second left is loud but not specially accentuated. Examined again some weeks after a course of iron and arsenic, which had relieved the anæmia; murmurs unchanged.

CASE XXXIII.—Angela W., aged eighteen. Four attacks since the first in 1880. No rheumatism. Heart, in 1884, said to be normal. Has had pain at heart, and is at times short of breath. *Status præsens*: Impulse forcible. Soft apex systolic, heard as far as middle axilla, and increased on exertion; not altered by position. Second left a little accentuated.

CASE XXXIV.—Florence B., aged twenty. Rheumatism six months before the attack. In 1880 an apex systolic murmur. Has had since then occasional attacks of palpitation. *Status præsens*: Impulse forcible; apex a little out, but no special enlargement. Apex systolic murmur, heard well to middle axilla. Marked accentuation of second left.

1881 (six years). Sixteen cases; nine affected.

CASE XXXVI.—Louis O., aged seventeen. At least five attacks since 1881. No rheumatism. No note of heart. No symptoms. *Status præsens*: Apex beat in fourth space in nipple line, heaving and forcible; dulness increased. Loud systolic murmur at apex heard to posterior axillary fold, but not above fourth space. When recumbent it is heard in second and third spaces as well. Second left very accentuated.

CASE XXXIX.—Frank N., aged thirteen. A second attack in 1884. No rheumatism. Heart said to have been normal in 1884. For some time has been very short of breath, and gets tired on exertion. *Status præsens*: Precordia bulges. Impulse diffuse; dulness increased. Presystolic thrill in fourth interspace. A blubbery presystolic murmur. Maximum intensity in fourth space. Loud blowing systolic bruit; heard also in axilla. Very accentuated second left. Aortic second feeble.

CASE XL.—William P., aged twelve. Second attack in 1883, third in 1885. No rheumatism. Condition of heart not noted. Has no symptoms. *Status præsens*: Diffuse apex beat in nipple line, in fourth and fifth spaces. Transverse dulness increased. In erect posture sounds clear. Recumbent, distinct apex systolic murmur transmitted along anterior axillary fold. In third and fourth interspaces double murmur, the diastolic not rough. Second left very much accentuated.

CASE XLI.—Joseph M., aged thirteen. First attack January, 1881; second, October, 1881. No rheumatism. In 1881 a soft systolic murmur. Has had vertigo and rushes of blood to head. *Status præsens*: Impulse not forcible; dulness slightly increased. No thrill, but loud shock of first sound. Rumbling presystolic murmur, maximum in fifth space in nipple line, is well heard to anterior axillary fold. Loudly accentuated second left. No systolic murmur even when recumbent.

CASE XLII.—Carrie B., aged ———. Second attack in 1884; third in 1886, all severe. No rheumatism. In 1881 heart normal. No symptoms. *Status præsens*: Visible, somewhat forcible, pulsation in third, fourth, and fifth spaces. Erect posture, no murmur; recumbent, systolic bruit at second left, localized. Second sound here loud, sharp, and reduplicated.

CASE XLIII.—Mary B., aged sixteen. Three or four slight attacks since 1881. In 1881 pains in joints, no swelling. In 1881 an apex bruit. Has had no heart symptoms. *Status præsens*: No enlargement. When erect, sounds clear; recumbent, systolic bruit at second left, with marked accentuation of second sound.

CASE XLV.—Marcus Van A., aged eleven. None since. No rheumatism. In 1881 a somewhat loud musical bruit. No symptoms. *Status præsens*: Apex beat in nipple line, fifth space. Impulse not specially forcible. Loud blowing systolic bruit at apex, propagated to axilla and heard well at scapula. Second left accentuated and reduplicated.

CASE XLVI.—Alice W., aged seventeen. Second attack in 1882. Pains in knees in 1882, and lately in shoulders. Heart normal in 1881 and 1882. *Status præsens*: Soft apex systolic murmur, not heard in axilla. Second left accentuated. No enlargement of heart. Has at times palpitation and shortness of breath.

CASE XLIX.—Jessie J., aged nineteen. Three attacks since. Rheumatism with attack in 1883, and again in 1885. Heart said to be



normal in 1885. *Status præsens*: Beat in fifth space outside nipple. Dulness increased. At apex a soft systolic bruit, not heard in axilla, except after exertion. In fourth space, in localized region, a soft diastolic murmur, not increased toward sternum, not heard at aortic or pulmonary cartilages; it also is intensified by exertion. Has "attacks at the heart," faints, and gets cold. Has much pain at times and is short of breath.

1882 (five years). Thirteen cases; ten affected.

CASE L.—Tillie M., aged fifteen. Attacks also in 1883 and 1886. No rheumatism, but lately has had pains in shoulders. No note of heart. Has had at times pain at heart and palpitation. *Status præsens*: Apex beat just within nipple, a little forcible. Apex systolic bruit heard along anterior axillary fold and in middle axilla. Second left accentuated.

CASE LII.—Annie B., aged eighteen. No rheumatism. In 1882 a loud apex systolic bruit. Has had shortness of breath and palpitation. *Status præsens*: Beat forcible, outside nipple line; dulness increased. Apex systolic murmur, heard also in axilla and at angle of scapula; also as high as second rib. Second left loudly accentuated.

CASE LIII.—Mary J., aged fourteen. Attacks also in 1883, '84, and '85. No rheumatism. Heart normal in 1882. No symptoms. *Status præsens*: Impulse forcible. Soft systolic bruit at apex, heard as high as third space, not propagated to axilla. Remarkable accentuation of second left.

CASE LIV.—Bessie P., aged thirteen. Second attack in 1883. Rheumatism in hands and feet with first attack. Heart said to have been normal. *Status præsens*: Impulse forcible. Apex in sixth space an inch outside nipple line. Slight presystolic rumble at apex. Loud systolic murmur in second and third interspaces, not so marked at apex. Second left loudly accentuated. No symptoms.

CASE LV.—Harriet H., aged eight. No rheumatism. Died of heart disease with dropsy, November 8, 1883.

CASE LVII.—Sadie C., aged twelve. Second attack in 1885. In 1886 ankles swollen and sore; never had rheumatism with the attacks of chorea. No note of heart in 1882. In 1885 "hypertrophied and loud apex systolic murmur." *Status præsens*: Apex an inch outside nipple line. Impulse forcible. Dulness increased. No thrill. High-pitched systolic bruit at apex, loud also in axilla and at angle of scapula. Very accentuated second left. Has much throbbing of heart on exertion, and has vomited after skipping.

CASE LIX.—Maggie W., aged fifteen. Second attack in 1885. No rheumatism. Heart normal in 1882. *Status præsens*: A soft murmur at apex, not transmitted; increased on holding breath. Second left very accentuated.

CASE LX.—Fannie S., aged eleven. Second attack in 1883, third in 1884, and fourth in 1885. Rheumatism in 1883; severe attack. In November, 1882, a basic systolic murmur, which persisted in 1884. In June, 1885, there were hypertrophy and evidence of aortic and mitral disease. Died of cardiac dropsy, July 11, 1886.

CASE LXI.—Catherine B., aged thirteen. A second slight attack in spring of this year. No rheumatism. No note of heart in 1882. *Status præsens*: Impulse forcible, at and a little outside nipple line. Dulness

increased. Feeble presystolic thrill. Loud apex systolic murmur, propagated to axilla. In fourth space just within nipple, a rumbling presystolic murmur. Second left very accentuated. Has had at times severe pain in heart; no shortness of breath.

1883 (four years). Fifteen cases; eight affected.

CASE LXII.—James G., aged thirteen. Second attack in 1885, third in 1886. No acute rheumatism; pains in shoulder. In 1886 a systolic apex murmur. *Status præsens*: Apex outside nipple line; large area of forcible impulse in fourth and fifth spaces. Transverse dulness increased. No thrill. High-pitched apex systolic murmur transmitted to axilla and angle of scapula. In fourth space a faint rumble before first sound; second left accentuated and reduplicated. Has no heart symptoms.

CASE LXIII.—Tinnie B., aged twelve. Second attack in 1884, third in 1886. No rheumatism. In 1886 well-marked cardiac lesions. *Status præsens*: Apex beat forcible, outside nipple line. Dulness increased. Loud, rough apex systolic bruit, transmitted to scapula; second left accentuated and reduplicated. Has pain, and at times palpitation.

CASE LXIV.—Henrietta K., aged twenty-one. Second attack in 1884. No rheumatism. In 1883 heart's action intermittent. *Status præsens*: Beat forcible. No thrill. Loud, rough apex systolic bruit heard at angle of scapula. Second left much accentuated. Has great shortness of breath on exertion.

CASE LXV.—Lorenzo D'A., aged eleven. Two slight returns. No rheumatism. No note of heart in 1883. *Status præsens*: Impulse slow, forcible; apex in fifth space, in nipple line. Soft apex systolic murmur, louder on exertion; not heard at mid axilla. Second left much accentuated and reduplicated. Has distress at heart on exertion.

CASE LXVI.—Nellie H., aged nine. Second attack in 1884, third in 1885. No rheumatism. No note of previous heart-condition. *Status præsens*: Apex beat diffuse, maximum in sixth space, one inch outside nipple line. Dulness increased. No thrill. Loud apex systolic murmur transmitted to angle of scapula. Just below and inside the nipple a soft presystolic bruit. Second left much accentuated. In December, 1886, the child had a sharp attack of cardiac dyspnoea.

CASE LXVII.—Edward R., aged twelve. Second attack in 1885. No clear history of rheumatism; has had pains. No note of heart. *Status præsens*: Beat in fifth, just outside nipple line. Dulness increased. Just above apex, in localized region, a presystolic murmur; louder in recumbent posture. When breath is held, soft apex systolic murmur. Second left much accentuated.

CASE LXXI.—Annie C., aged eleven. Bad attack for a month; no recurrence. No rheumatism. No note of heart in 1883. *Status præsens*: Beat at nipple, in fourth space. Transverse dulness increased. Feeble thrill above apex. Rough presystolic murmur in third and fourth spaces; heard also along pectoral fold. Just outside apex a soft systolic. Loudly accentuated second left. Is short of breath on exertion.

CASE LXXIV.—William H., aged fifteen. Still has twitches at times. No rheumatism. No note of heart. *Status præsens*: Apex beat in nipple line. Dulness increased. Feeble presystolic thrill at apex. In second left interspace a loud, rough, systolic murmur. In third and fourth spaces a softer bruit. Distinct presystolic rumble above apex beat. First sound reduplicated at apex. Second left much

accentuated. Has what his mother calls "asthma spells," particularly on exertion.

1884 (three years). Thirteen cases; ten affected.

CASE LXXVII.—Harry B., aged thirteen. Second attack in 1885, third in 1886. Rheumatism with attack in 1884. Apex murmur in 1886. *Status præsens*: Impulse feeble, just inside nipple line. No thrill. Dulness not increased. Soft apex systolic bruit; heard well to mid-axilla. Rough presystolic murmur, maximum intensity at apex. Both intensified after exertion. Loudly accentuated and reduplicated second left. No palpitation; no shortness of breath. Cheeks are flushed, and he has a cardiac look.

CASE LXXVIII.—Ida M., aged fourteen. No other attack. No rheumatism. No note of heart. *Status præsens*: No enlargement. Soft apex systolic bruit propagated along anterior axillary fold. Systolic murmur at second left space. Loudly accentuated left. Has no symptoms.

CASE LXXIX.—George G., aged thirteen. No other attack. Had pain in left hip in 1884. Heart normal. *Status præsens*: No enlargement. Soft apex systolic bruit; not heard in axilla, but well-marked in third left apex. Second left very accentuated, and the diastolic shock here loud.

CASE LXXX.—Nellie M., aged eleven. Right knee was swollen. No note of heart. *Status præsens*: Forcible apex beat in fifth space, one inch outside nipple line. Dulness increased. At apex first sound booming and echoing. In third and fourth left spaces loud systolic bruit; feeble at second left cartilage; not audible in axilla; faintly heard in mid-sternum. Much accentuated second left. Has no symptoms.

CASE LXXXII.—John D., aged eighteen. Second slight attack in 1886. In 1887 slight rheumatism. In 1884 soft murmur at base. *Status præsens*: Impulse just within nipple. Dulness increased. No thrill. At apex a rumbling presystolic murmur. No systolic bruit audible at apex. At fourth left and up and down the sternum is a long-drawn diastolic murmur, of maximum intensity on sternum, opposite fourth cartilage. Heard at aortic cartilage and at xiphoid. No aortic systolic bruit. Second left very accentuated. Posture did not alter the murmurs. He had no heart symptoms.

CASE LXXXIII.—Kate H., aged fifteen. Rheumatism very badly at the time. Heart said to be normal. *Status præsens*: Apex beat forcible, outside nipple line. Cardiac shock over a large area. No thrill. Loud apex systolic murmur propagated along anterior axillary fold. Second left much accentuated. Has no heart symptoms.

CASE LXXXIV.—Henry M., aged fifteen. No rheumatism. Heart normal in 1884. *Status præsens*: Impulse diffuse in fourth and sixth spaces, one inch outside nipple line. First sound at apex booming. When recumbent a soft systolic murmur in second and third left spaces near sternum. Second left much accentuated.

CASE LXXXVI.—Lillie D., aged twelve. No rheumatism. Heart normal in 1884. *Status præsens*: No enlargement. When recumbent a soft, long, apex systolic murmur, not heard in axilla or in second or third spaces. Disappears when erect. Second dull and loud, not sharp and ringing, like second right.



CASE LXXXVII.—Fannie P., aged ten. Second attack in 1885. Pains in wrists, but no swelling. In 1885 apex murmur, presystolic; soft basic murmur; hypertrophy. *Status præsens*: Forcible apex beat in fifth space, outside nipple. Feeble thrill. Loud, high-pitched apex systolic bruit, transmitted to scapula; and, in fact, all over left chest. Presystolic bruit. At aortic cartilage a rough, systolic murmur. Second left accentuated. Has palpitation at times.

CASE LXXXIX.—Annie T., aged thirteen. Several slight returns since 1884. Rheumatism three months after the chorea. No note of heart in 1884. *Status præsens*: Action rapid, apex a little out from nipple line. Dulness increased. Loud, rough systolic bruit at apex, transmitted to scapula. Second sound very accentuated at third left cartilage. Has "spells" with her heart; has fainted. Is short of breath on exertion.

1885 (two years). Eighteen cases; five affected.

CASE XCI.—Lizzie B., aged fifteen. No attack since. No rheumatism. No note of heart. *Status præsens*: Impulse strong. Thrill at apex. Localized systolic murmur at apex, not heard in axilla or on third or second spaces. Loudly accentuated second left.

CASE XCII.—Alice N., aged ten. No rheumatism. In 1885 loud mitral systolic. *Status præsens*: Apex beat diffuse in fourth and fifth spaces in nipple line. Transverse dulness increased. Apex systolic murmur, heard beyond mid-axilla; intensified in recumbent posture. Marked accentuation of second left.

CASE XCVII.—William R., aged nine. No rheumatism. Heart in 1885 said to be normal. *Status præsens*: No enlargement. First sound not clear, and on exertion a soft systolic murmur at apex; heard also two inches beyond nipple, and as high as third rib. Loudly accentuated second left. Has no symptoms.

CASE C.—Georgie G., aged thirteen. No rheumatism. In 1885 a basic systolic murmur. *Status præsens*: Impulse diffuse, forcible; apex just outside nipple line. Dulness increased. Thrill. At apex loud systolic bruit, propagated to posterior axillary fold. Second left dull, thudding, and accentuated. Heart's action irregular. Has palpitation and shortness of breath.

CASE CI.—Jennie N., aged nine. Second attack in 1886, in which she had rheumatism. Heart in 1885 normal. In 1886 loud apex systolic murmur. *Status præsens*: Impulse forcible, apex in nipple line. Dulness increased. Apex systolic transmitted to axilla and angle of scapula; heard also as high as second rib. Second left loudly accentuated. Has, at times, throbbing, palpitation, and pain.

Of the 43 cases in which the heart was found normal, 12 had had three or more attacks, 8 had had two, and 23 a single attack. There was a history of rheumatism in 8—*i.e.*, 18.6 per cent. In 6 of these cases the rheumatism was acute. In only 2 cases had there been a murmur noted at the time of the original attack.

From the cases presenting abnormal physical signs, 13 may be separated as examples of functional trouble. They are cases without signs of enlargement of the heart and with localized or variable murmurs. Ten presented soft apex systolic bruits not propagated, in 3

variable with position. In most of these there was accentuation of the second left pulmonary sound, but I do not think much stress is to be placed upon this sign in young persons, as it is by no means uncommon in normal hearts. Particular attention was paid to this point in the examination of all the cases and comparison made between the sounds in the second right and second left spaces. There were 10 normal cases in which the pulmonary sound was distinctly louder than the aortic, and in some instances reduplicated. No note was taken of the murmurs, so often developed in the region of the pulmonary artery during respiration and which are extremely common in thin-chested children. In 2 cases the sounds in this region were clear in the erect posture, but in the recumbent position systolic bruits developed; in both the second sound was accentuated, and in one the area of pulsation somewhat increased. In a third case there was a soft systolic murmur in the second and third spaces in the recumbent position only, with accentuation of the pulmonary sound and the apex beat outside the nipple line. In some of these there may have been organic changes in the valves, but I deemed it best to exclude all doubtful cases.

There remain for consideration 54 cases with signs of valve disease. In 21 cases there had been three or more attacks of chorea.

The facts regarding rheumatism are interesting. In 22 cases, 40.7 per cent., there was a distinct history of articular trouble, sometimes with the chorea, but in 6 cases from one to five years after the attacks. Comparing the frequency of rheumatic affection in this group, 40.7 per cent., with that in the total number of cases, 15 per cent., or with the group of 43 normal cases, 18.6 per cent., we see the influence this disease exercises in producing the heart lesions. We have, however, the larger proportion, 59.3 per cent., of the cases without any history of rheumatic trouble. Of the 21 cases which had had three or more attacks of chorea, only 7 had rheumatism.

In this group there are rather more than 3 females to 1 male, a proportion considerably greater than in the total number of cases.

With reference to the nature and seat of the lesion, there were 44 cases of uncomplicated mitral affection and 4 instances of combined aortic and mitral disease. In 25 cases there was a mitral systolic murmur; in 17 a distinct presystolic murmur, with or without a thrill, and usually with a systolic bruit. Of the aortic lesions Case XII. presented a soft aortic direct murmur and a mitral systolic; Case XXIV. a double aortic murmur as well as a mitral systolic; Case LX. died of combined aortic and mitral disease; Case LXXXII. presented the unusual combination of an aortic diastolic and a mitral presystolic murmur. The overwhelming proportion of cases, with mitral lesions, is what we might expect from the constancy with which the acute endocarditis of rheumatism and chorea attacks these valves

There are many points of interest in physical diagnosis which these cases illustrate, but I am only concerned now with the clinical problem of the frequency with which organic heart disease follows chorea.

Not many of the cases had subjective symptoms of cardiac disease. In 14 instances there was complaint of shortness of breath; 16 cases had attacks of palpitation, and in 6 cases there was cardiac pain. Two cases had died of heart disease, 1 was in bed with cardiac dropsy, and in several others there were premonitions of heart failure. The majority illustrated the important clinical law in valvular disease, that the symptoms do not result from the lesion, but from failure in the compensatory action which for years may equalize the circulation and obviate completely the most serious mechanical defect.

A study of these cases justifies, I think, the following conclusions:

1. That in a considerable proportion of cases of chorea—much larger than has hitherto been supposed—the complicating endocarditis lays the foundation of organic heart disease.

2. In a majority of the cases the cardiac affection is independent of rheumatism, and cannot be regarded as in any way associated with it; unless, indeed, we hold with Bouillaud, that in the disease "*chez les jeunes sujets le cœur se comporte comme une articulation.*"

3. As the presence of an apex systolic murmur in chorea is usually an indication of the existence of mitral valvulitis, as much care should be exercised in this condition as in the acute endocarditis of rheumatism. Rest, avoidance of excitement, and care in convalescence, may do much to limit a valvulitis, and obviate, possibly, the liability to those chronic nutritional changes in the valves wherein lies, after all, the main danger.

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## HEREDITARY TREMOR,

A HITHERTO UNDESCRIBED FORM OF MOTOR NEUROSIS.<sup>1</sup>

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THE object of this paper is to call attention to a peculiar hereditary motor disorder which has heretofore never to my knowledge been systematically described by medical writers.

DEFINITION.—The affection in question consists of a fine tremor, con-

<sup>1</sup> I am under great obligations to Dr. Henry Boynton and Dr. Fred. T. Kidder, of Woodstock, Vt., and to Dr. Coulard, of Brattleboro, Vt., for assistance in securing data for my histories.



stantly present in typical cases during waking hours, voluntarily controlled for a brief time, affecting nearly all the voluntary muscles, chronic, beginning in very early life, not progressive, not shortening life, not accompanied with paralysis or any other disturbances of nervous function. It resembles to some extent the tremor of paralysis agitans, still more a simple neurasthenic tremor. A most striking clinical feature is its marked hereditary or family type, and its transmission along with other nervous diseases.

HISTORICAL.—Sauvages (*Nosolog. meth.*, 1766, quoted by Reynolds's *System of Med.*, iii. p. 196) refers to the case of a pregnant woman who suffered from a fright and gave birth to a child affected with a "feeble" tremor. Most (*Encyclopædia de méd. Praxis*, Paris, 1836, ii. 555) refers in a few words to several cases of tremor which all occurred in one family. Sanders (Reynolds's *System*, i. p. 724) reports a case of paralysis agitans non-senilis beginning at the twelfth and lasting till the sixty-sixth year. Trousseau says that senile tremor is not confined to the aged, but may affect persons of middle age or even adolescents. Weschede (Virch. *Archiv*, Bd. l. Heft 2) reports a case of supposed paralysis agitans occurring in a boy caused by the kick of a horse. Post-mortem showed, however, that this was a case of disseminated sclerosis. And the statements of Duchenne (Ziemssen's *Cyclop.*, xiv. p. 396) and other early observers that paralysis agitans occurs sometimes in early life are based possibly on observations of cases like Meschede's. Hennis Green, Gowry, and Sanders speak of temporary tremors occurring in childhood. Wharton Sinkler, in Pepper's *System of Medicine*, vol. v., art. "Tremor," speaks of a patient who had suffered from tremor all her life. Since finishing this article my attention has been called to a case of "congenital tremor," reported by Dr. Predazzi, of Geneva (*Gazetta degli Ospitali*, June 26, 1887). The patient had suffered from birth from an oscillatory tremor of the head and eyeballs.

The above forms all that I can find bearing on the affection I am about to describe and it is evident that no one has more than incidentally, if at all, observed and reported such cases as my own. Most, Axenfeld, and Sinkler have evidently seen examples of the neurosis I am describing.

CLINICAL CASES.—I have seen and studied the tremor in three families, and in all it preserves a general clinical resemblance. In one family I have obtained by far the most complete and striking records, and I can best serve my purpose by first giving an account of the disease as it occurred in one of its members.

FAMILY A. CASE I.—N. R., aged seventy-seven, w. U. S. The family history will be referred to later. The patient is a man of medium weight, spare build, and of nervous, excitable temperament. He is a much more than ordinarily intelligent man, taking an active interest in religious

political, and local affairs. In early life he took a degree in medicine, but never practised. His habits have been good. He has never used alcohol or tobacco. He has had no fits or other nervous disease, but has had pneumonia five times. He has had the tremor from early childhood, it has continued about the same for over seventy years. It affects his arms most, but also his lower limbs. Any noise or excitement increases it, and enlarges its range. He has no nystagmus, and his eye-sight is good. The tremor affects the two sides about equally. It is fine in character, like a neurasthenic tremor, and there is not that wide range in the movement characteristic of old cases of paralysis agitans. It is accompanied with a slight contracture of the fingers, but otherwise there is no motor disturbance, such as rigidity, cramp, or paresis. The tremor can be voluntarily controlled for a short time, so that the patient has been able all his life to pursue his trade of watch-making, and he acquired justly the reputation of being the best workman in his section of the country. I have myself seen him pick up a piece of the delicate machinery of a watch in his forceps, carry it to the place where it should be fitted, the hand trembling like an aspen until just before it reached its destination, when it suddenly became firm and steady and deposited its burden just in the right place. The tremor does not increase, nor does it cease when a voluntary movement is made as shown above; it is only by a distinct and special effort of the will that momentary control is obtained. It is slightly apparent in the handwriting, though this is now as steady as that of most men who are seventy-seven years old. He controls the tremor better and writes more smoothly with a lead-pencil.

When excited the tremor affects his head, which oscillates, and also his muscles of articulation, so that speech is indistinct, while all the extremity muscles are affected in a greatly exaggerated way, thus increasing greatly his apparent mental excitement. The tremor ceases during sleep.

Close examination shows his muscular system to be normally developed and strong. The patella tendon reflex is normal, not absolutely exaggerated at least, though considering his age it may be relatively so. His gait and posture are natural, nor does he in any way show evidence of natural malformation, or progressive nervous disease. He can even now do work upon a watch.

This patient presents in its most marked form the tremor which runs through the family. The history of this is most interesting.

I. The grandfather was greatly addicted to alcohol and tobacco. He had no tremor.

II. The father was a man of very nervous temperament, quick in movement, violent in temper. He used no alcohol or tobacco. Had no tremor, but became insane early in life and died at the age of fifty-five.

His wife was a strong, healthy woman, without tremor.

III. The patient, whose history has been given, was one of nine children, six sons and three daughters, all of whom had the tremor and a slight flexion of the fingers.

Of the nine, (1) the oldest child, a daughter, had nine children, four sons and five daughters, one son became insane. All the children had the tremor more or less, especially when excited.

(2) The second child, a boy, became insane at twenty-one, but lived till eighty. He had the tremor.

(3) The third child, a daughter, married a man who became insane. She had a son and two daughters, the son became insane probably. The daughters were healthy. All had the tremor.

(4) The fourth child, a son, had five children, who all had the tremor.

(5) The fifth child was the patient whose history is given. He was married twice, and had two children by the first, and one by the second wife. These children were unusually intelligent, and even talented. All had the tremor in a slight degree.

(6) The sixth child was a son still living and reported "very peculiar." He married a woman who became insane, and had five children. One was an inebriate. All had the tremor.

(7) The seventh son was intemperate, was twice married, and had nine children, all having the tremor. One of the children, a daughter, had epilepsy. She herself has had four children, one of these had decided tremor. The three oldest had epilepsy, two dying in eclamptic attacks.

(8) The eighth child, a daughter, is still living, she has never married. She was always peculiar, and has the tremor markedly.

(9) The ninth child, a son, died childless. He had no tremor.

SUMMARY OF HISTORY OF FAMILY A.—*Grandfather* very intemperate, but never insane.

*Father* insane, but not intemperate. He had nine children. They all had the tremor.

One son insane from early life.

One, a lover of strong drink, but not a confirmed inebriate.

Two were very peculiar, and would be called now-a-days "cranky."

Two died without marrying.

All grew to adult life and most of them lived to advanced old age. Several showed intelligence and mental activity much above the average.

These nine, or rather seven of them, produced thirty-four children; and all of these that lived to grow up showed the family tremor, through in varying degrees. In two branches insanity appeared, in one a member was intemperate, and in one branch epilepsy developed in the daughter and grandchildren. The tremor also appeared in one of these latter. I cannot learn whether it has developed in other branches among the grandchildren, but, if so, it is much less marked, and the opinion in the family is that the tremor is dying out. The total number of cases in the family is forty-five.

In none of these cases did the tremor increase upon them as they grew older. It is a curious coincidence that the family early embraced



spiritualism, and that that has passed through the different generations along with the tremor.

GENEALOGICAL TABLE SHOWING THE DEVELOPMENT OF THE  
HEREDITARY TREMOR IN FAMILY A.

GENERATION I.	II.	III.	IV.	V.
			1st, son, insane, <i>tremor</i> . 2d, " " <i>tremor</i> . 3d, " " " 4th, " " " 5th, daughter, <i>tremor</i> . 6th, " " " 7th, " " " 8th, " " " 9th, " " "	
		1st child, daughter, <i>tremor</i> . Married.		
		2d child, son, insane at 20; died at 80; <i>tremor</i> . Single.		
		3d child, daughter, <i>tremor</i> . Married.	1st, son, insane? <i>tremor</i> . 2d, daughter, " 3d, " " "	
		4th child, son, <i>tremor</i> . Married.	1st, son, <i>tremor</i> . See hist. 2d, " " " 3d, daughter, <i>tremor</i> . 4th, " " " 5th, " " "	
Grandfather, intemperate, and a tobacco user. No tremor.	Aunt, insane. Father, temperate, insane; no tremor. Aunt.	5th child, son (see history), <i>tremor</i> . Married.	1st, son, <i>tremor</i> . 2d, " " " 3d, " " "	
		6th child, son; very peculiar; <i>tremor</i> Married.	1st, son, intemp. <i>tremor</i> . 2d, " " <i>tremor</i> . 3d, " " " 4th, " " " 5th, " " "	
		7th child, son; intemperate. Married.	1st, son, <i>tremor</i> . 2d, " " " 3d, " " " 4th, daughter, <i>tremor</i> and epilepsy. 5th, daughter, " " 6th, " " " 7th, " " " 8th, " " " 9th, " " "	1, epilepsy, <i>tremor</i> . 2, " " 3, " " 4, 1 year old.
		8th child, daughter, "peculiar," <i>tremor</i> . Single.		
		9th child, son, <i>tremor</i> . Single.		

CASE II.—Through the kindness of Dr. Couland, of Brattleboro, Vt., I am able to give an account of the tremor occurring in its second generation.

The person examined is also a watchmaker and jeweller, and an excellent one. He is about forty years of age and married. His health has been good, his habits temperate, and he has never had any other nervous disorder than the one to be described. He is a man of nervous temperament, but quiet in manner and habits.

His tremor began in early childhood, and no cause other than heredity is assigned. It is bilateral and affects his arms chiefly. Occasionally there is tremor of the orbicularis on the right side (perhaps from wear-

ing his jeweller's glass?). He has also nystagmus, but never tremor of tongue, or lips, or neck muscles. The tremor has not, he says, progressed, and he says that it does not interfere with his work, though Dr. Couland seems to think that occasionally it does. It probably is annoying because it requires an extra effort to steady the hand. The patella tendon-reflex is decidedly exaggerated.

He does not suffer from rigidity, cramps, or neuralgia. I have long personally known the patient in previous years, and have seen him at his work. His tremor is fine, like that of the preceding generation.

We may possibly have a developing organic trouble in this case, but the family history is against it.

I have fortunately been able to secure evidence sufficient to show that hereditary tremor is not a freak confined to the family just described.

I have the records of a second family in which there were three cases, and of a third family in which there were two. Two of the cases in the second family I have seen, and, indeed, have personally known for a long time.

FAMILY B.—In this family the tremor is found in only three persons, an uncle and two nephews, on the maternal side. The parents are both healthy, and have been temperate and regular in their habits.

The children consisted of three sons and a daughter. One son was a person of irregular habits, and died in early manhood. He had no tremor. The other two have had the tremor from childhood, but no other nervous disturbance. The one who suffered from the tremor most had, however, indulged a good deal in tobacco and alcohol. The details of his case were as follows:

CASE I.—He is a man of about thirty-five years of age, of strong physique, a carpenter by trade. He is of nervous temperament, quick, and intelligent. Has had no fits or nervous disorder other than the tremor. This began in infancy, and has been somewhat worse than it is at present. This, doubtless, was when he had been dissipating. It does not interfere with his work as a carpenter, but at times it is not perfectly under control, and has interfered with his writing and eating. It affects his arms mainly, is very fine in character, and constantly present. He has no nystagmus or speech disturbance. His deep reflexes are a little exaggerated. It is a tremor that does not increase or cease on voluntary motion, and is under brief control of the will.

CASE II.—The brother is a man of over forty years of age, of large, powerful build, and robust health. He is a business man of unusual ability, and a man of amiable disposition and excellent moral character, and temperate habits. He has always had good health and suffered from no intercurrent nervous disorder. His tremor began in early childhood, without known cause. It is much slighter in amount than in the brother, and he hardly notices it except that in writing sometimes he has to steady his hand by voluntary effort; yet he can, as a rule, write a perfectly smooth hand. Whatever makes him nervous increases the tremor. It has now lasted over thirty years without any increase. He has several healthy children, who have no tremors. There is no nys-

tagmus, and the knee-jerk is normal. The tremor resembles his brother's in fineness, and in its affecting the upper extremities chiefly. It ceases during sleep.

FAMILY C.—Of this family I have been able to get very few details, and there is some doubt as to the hereditary character of the tremor.

CASE I.—James M., aged fifty-five. He came to my clinic at the Post-graduate School suffering from a tremor which presented the general characters of that of paralysis agitans. He said that he had always had the tremor since he was a boy, it had always been more severe on the right side. The head and eyes were not affected.

The patient stated that his uncle had been affected in the same way, but still more severely. In the uncle's case the head was affected.

#### THE GENERAL FEATURES OF HEREDITARY TREMOR.

The tremor in all the foregoing cases bears a general clinical resemblance. It begins in infancy or childhood, sometimes being brought out by an infectious fever. It continues without progressing in severity during a lifetime, which it does not shorten. The family history will reveal neuroses or psychoses. The upper extremities are most noticeably affected, but it may involve the head, neck, eye, laryngeal, or, in fine, any of the voluntary muscles. It ceases during sleep, and can be inhibited temporarily by the will. Everything that produces excitement or nervousness increases the tremor. It may be barely noticeable, except under some excitement, or the influence of alcohol or tobacco. It does not interfere with delicate coördination. It neither stops nor increases on ordinary voluntary movements; in this respect differing from the tremors of paralysis agitans, or multiple sclerosis. There may be with it slight contractures of the fingers, also developed early and non-progressive, but there are none of the forced movements, rigidity, paresis, subjective sensations, or vasomotor disturbances of paralysis agitans, while the head and neck are not so much affected, as in senile tremor. The tendon-reflexes may or may not be exaggerated.

The tremor is most nearly like that occurring in neurasthenic states, or from poisons, only there is no general nerve exhaustion, and no muscular weakness.

It is associated with other neuroses or psychoses, such as insanity, inebriety, and epilepsy, and also with examples of unusual talent or intellectual vigor. And it illustrates the fact that a neuropathic taint in a family may develop as a disease, or as some brilliant mental endowment. The tremor has a tendency in successive generations to die out. It may be directly hereditary or only of a family type, occurring in uncle and nephew. It may occur in one generation only as a congenital neurasthenic tremor. It is entirely distinct from paralysis agitans, in the fact of its heredity, non-progressiveness, and absence of any other neuromotor or vasomotor symptoms. It differs symptomatologically also





lungs. Insufficient movement of air occurs when the calibre of the air-passages is reduced, or when from any cause the expansion or retraction of the chest is impeded; and this imperfect movement of air is usually recognized as a cause of the dyspnœa that occurs in both asthma and bronchitis.

#### ASTHMA.

The symptoms of asthma are, indeed, typically those that are to be associated with imperfect movement of air. They have been thus described by Riegel:<sup>1</sup>

"The patient having gone to bed perfectly well, is suddenly awakened in the night, while sleeping quietly, by an intense sense of oppression and anxiety. Breathing is very laborious, and the respiration is attended with audible whistling and rattling, and the dyspnœa rapidly increases to an excessive degree. The cyanosis increases from minute to minute, the face becomes bluish-red and turgid, the eyeballs protrude, the patient supports himself on both arms to struggle powerfully for air, and the face becomes bathed in perspiration. The patient can no longer get his breath in the recumbent position, and often assumes the most varied attitudes in order to appease in a measure his craving for air. . . . Soon the patient hurries to the window to struggle for a mouthful of fresh air. In spite of all this, he does not appease his craving for air, even by the forcible action of all his auxiliary muscles. The paroxysm continues at its height for a long time—one, two, or more hours—and then it gradually subsides. The respiration becomes easier again, the cyanosis disappears, the patient gradually feels freer and freer, and then drops off into a quiet, deep, uninterrupted sleep."

Now, what is the cause of this intense and distressing dyspnœa? No anatomical lesions are found which are sufficient to account for it. It is regarded as a functional disorder produced by alterations in normal physiological conditions, or by temporary structural changes which disappear with the asthmatic paroxysm.

Speculation has been active, however, in advancing hypotheses regarding the nature of the functional or temporary structural disturbances which so obviously produce an obstruction to the movement of air along the respiratory passages. Setting aside the theories that were originated previously to the discoveries of Lænnec and Auenbrugger in physical diagnosis, when asthma was a term applied not only to pulmonary dyspnœa, but also to the dyspnœa of diseases of the heart and larger blood-vessels, of the pleura, glottis, stomach, and other organs and parts of the body remote from the lungs, it is probable that the first certain and firm basis of knowledge as to its causation was supplied by the demonstration by Reisseissen,<sup>2</sup> Prochaska, and Kölliker, of the existence of a muscular structure in the bronchi. The demonstration of the contractile power of this muscular structure, by Williams<sup>3</sup> and Longet,<sup>4</sup> amply confirmed

<sup>1</sup> Ziemssen's *Cyclopedia of the Practice of Medicine*, 1877, vol. iv. p. 557.

<sup>2</sup> *Ueber den Bau der Lungen*. Berlin, 1822

<sup>3</sup> *Transactions of the British Association for the Advancement of Science*, 1840, p. 411.

<sup>4</sup> *Comptes Rendus des Sciences*, 1842, t. xv. p. 500.

by the subsequent experiments of Paul Bert<sup>1</sup> and others, led to a revival of the old and, for a time, discredited view, that asthma is produced by a spasmodic affection of the muscles and nerves of respiration. The asthma convulsivum of Willis then became the asthma of bronchial spasm of Cullen, Romberg, Bergsen, Trousseau, and Salter; and for more than half a century was the generally accepted doctrine, notwithstanding the enunciation of other theories, usually of a purely speculative character, such as those of Todd, Brée, Budd, Walshe, and others.

The most formidable attacks made on the theory of bronchial spasm, however, were probably those of Wintrich, in 1854, and of Weber, in 1872; as the important hypothesis of Leyden,<sup>2</sup> that the asthmatic paroxysm is produced by irritation of the vagus terminations in the bronchi, by minute sharp-pointed crystals, involves as an explanation of the paroxysm a reflex spasm of the bronchial muscles.

Wintrich<sup>3</sup> denied that spasmodic contraction of the bronchi is possible, and maintained that the only explanation consistent with the phenomena, is to be found in tonic spasm of the diaphragm alone, or of the diaphragm and muscles of respiration together. He was led to adopt this theory from the results of some experiments which appeared to show that the bronchi did not contract under stimulation, and from a belief that the enlargement and hyper-resonance of the lungs, which nearly all observers had recognized during the paroxysm of asthma, could not be explained by spasm of the bronchial muscles. His opinions were supported by Bamberger,<sup>4</sup> who further pointed out that in a few cases of asthma the lower limit of hepatic dulness remains unchanged during both expiration and inspiration, at the line of deep inspiration. Wintrich's opinions and statements have not remained unchallenged. The most damaging criticisms they have sustained have been from Biermer,<sup>5</sup> who justly occupies the position of being one of the ablest supporters of the old theory that asthma is caused by spasm of the bronchial muscles. Biermer has the further merit of having prominently shown that asthma is characterized by expiratory dyspnœa, which distinguishes it from the dyspnœa of obstruction in the larger air-passages, where the embarrassment is more decided during inspiration. He endeavors to prove that spasm of the bronchi is able to cause enlargement of the thorax, increased percussion resonance over the lungs, descent and restricted movements of the diaphragm, and relative difficulty of expiration as contrasted with

<sup>1</sup> *Leçons sur la Physiologie comparée de la Respiration*, 1870, p. 379.

<sup>2</sup> *Virchow's Archiv*, 1872, Bd. 54, p. 324.

<sup>3</sup> *Virchow's Handbuch der speciellen Pathologie und Therapie*, 1854, Bd. v; und *Krankheiten der Respirationsorgane*, Erlangen, 1855-57.

<sup>4</sup> *Wurzbürger medicinische Zeitschrift*, 1865, Bd. vi.

<sup>5</sup> *Ueber Bronchialasthma*, *Sammlung Klinischer Vorträge*, 1875, 12, p. 39.



inspiration; and thus he apparently succeeds in advancing a sufficient explanation of the phenomena of asthma.

The other most formidable opposition which the doctrine of bronchial spasm has encountered, may, for convenience, be associated with the name of Weber, although his theory seems to be but a modification of that previously advanced by Traube. Weber<sup>1</sup> ascribed the asthmatic attack to a sudden congestive thickening of the bronchial mucous membrane through the agency of vasomotor nerves, and he compared the changes that were thereby produced to the local swelling and abnormal secretion of the nasal mucous membrane, which, in many persons, are produced by catarrh. In so far as the causation of the asthmatic dyspnoea is concerned, this theory also agrees with the old supposition that the retrocession of certain cutaneous eruptions is productive of asthma, revived in more modern times by Waldenburg,<sup>2</sup> in his so-called herpetic asthma, and also by Sir Andrew Clark,<sup>3</sup> in a paper published last year on the theory of bronchial asthma.

The three explanations of the production of the asthmatic paroxysm, which seem at the present time to be maintained more than any others, are, therefore, embodied in the theory of bronchial spasm, in the theory of spasm of the diaphragm, associated, or not associated, with spasm of the other ordinary or extraordinary muscles of respiration, and in the theory of constriction of the bronchial tubes by swellings of a hyperæmic, herpetic, or urticaria-like character.

The existence of these contending theories is a sufficient proof of the difficulties that are encountered in explaining the dyspnoea of asthma. The observation of symptoms, the assistance that has been derived from advancements in the physiology of the respiratory and nervous systems, and the great increase in knowledge of the pharmacology of the substances that are used as remedies, do not appear to have entirely solved the difficulties. No doubt the second theory, that of Wintrich, has sustained from Biermer a more damaging criticism than either of the two others has yet met with; and it may be regarded as demonstrated that spasm of the diaphragm, combined or not combined with spasm of the muscles of respiration, is not the essential or primary cause of the symptoms of asthma, however such spasm, in some cases and in some degrees, may occur as a secondary condition during the paroxysm. That able and trained observers are divided in their belief as to the correctness of the other two theories, is shown by the statement of Dr. Geddings,<sup>4</sup> of America, that the retrocession of cutaneous eruptions as a cause of asthma, has of late years "found but few advocates among intelligent physicians;"

<sup>1</sup> Ueber Asthma Nervosum Tageblatt des 45. Versammlung deutscher Naturforscher und Aerzte zu Leipzig, 1872, p. 159.

<sup>2</sup> Berliner klin. Wochenschrift, 1873.

<sup>3</sup> The American Journal of the Medical Sciences, January, 1886, vol. xci. p. 104

<sup>4</sup> Pepper's System of Medicine, 1885, vol. iii. p. 193.

and of Riegel,<sup>1</sup> that the severer grades of asthma "can be explained by the mere tumefaction of the mucous membrane, seems to me improbable;" while on the other hand, Sir Andrew Clark<sup>2</sup> affirms "that the bronchial spasm theory of asthma is either inadequate to explain the phenomena of the paroxysm, or is not in harmony with the present state of physiological and pathological knowledge."

It seems obvious that some additional facts are required before the truth can be arrived at. The obtaining of such facts is desirable, not merely because of the interest that is attached to the elucidation of the pathogenesis of this as of all diseases, but much more importantly, on account of the basis that would thereby be gained for the proper application of remedies. A very different treatment, for example, would be suggested for the cure of a dyspnœa dependent on stenosis of the bronchial tubes caused by hyperæmia, from the treatment of a dyspnœa dependent on stenosis caused by spasm of the bronchial muscles.

In considering the problem that is presented, we may assume that stenosis of the bronchial tubes is present. It is, indeed, impossible to overlook the significance of what are, after all, the most constant, as well as the most prominent, of the physical signs that accompany the asthmatic paroxysm. On auscultating the chest, there are heard râles of a snoring, cooing, and whistling character, unaccompanied during a part of the paroxysm, in most cases, by any moist sounds, and, in not a few cases, heard during the entire paroxysm unassociated with any moist sound, and even terminated, as Graves<sup>3</sup> has pointed out, without any expectoration whatever. The bronchi in which these sounds occur are furnished with bloodvessels, which might dilate and produce hyperæmic swellings; they are also furnished with muscles, which might contract spasmodically and here and there produce constrictions. The possibility of the latter causation of constriction cannot, I think, admit of a doubt, since the discoveries of the earlier investigators have been so amply confirmed by Paul Bert, and by Graham Brown and Roy.<sup>4</sup>

It occurred to me that in deciding between the two theories of the causation of the asthmatic paroxysm which seem, at present, to hold the field, some assistance might be derived by determining if the auscultatory phenomena to which I have referred can be modified, and simultaneously the dyspnœa reduced or removed by the action of any pharmacological agent that markedly influences the contractility of muscle, and especially of non-striped muscle. It is well known that many substances relieve the dyspnœa of asthma—such substances, for example, as atropine, morphine, and chloral—but their influence upon the auscultatory phenomena has not, so far as I know, been investigated. In the case

<sup>1</sup> Ziemssen's *Cyclopedia of the Practice of Medicine*, 1877, vol. iv. p. 554.

<sup>2</sup> *Loc. cit.*, p. 110.

<sup>3</sup> *Clinical Lectures on the Practice of Medicine*, 1864, p. 507.

<sup>4</sup> *The Journal of Physiology*, vol. vi., 1883; appendix, p. xxi.

of the substances I have mentioned investigation of this kind is not, indeed, likely to afford distinct or incisive results, as their influence on the dyspnœa is uncertain, and, usually, but slowly produced, and as they involve in their sphere of action many parts of the nervous system; while it has not been proved that independently of this involvement they influence the contractility of non-striated muscle in a very distinct or powerful manner.

In the absence of evidence of the existence of any substance that rapidly and distinctly modifies the contractility of the bronchial tubes, the analogy in structure and nerve relationship between the bloodvessels and the bronchial tubes suggested that the most appropriate substances to be employed for the purpose I have stated would be those which are capable of modifying the contractility of bloodvessels by direct contact with them. Nitrite of amyl has been shown to possess this action, and the probabilities are in favor of its being possessed also by other nitrites and by substances that have essentially the same pharmacological action.

It seemed advisable to ascertain positively, in the first place, if all the chief nitrites possess this action, and, if so, to what extent they severally exert it. I was fortunate in inducing Mr. Sillar to undertake a series of experiments having these objects in view. The experiments entailed a large amount of patient observation, and they were made with great care and with every precaution to insure accuracy. The mode of procedure was as follows: The brain and spinal cord having been destroyed in a frog, the heart of the animal was exposed and all the bloodvessels connected with it, except the left aorta and the veins opening into the sinus venosus were ligatured. A canula was then tied into the left aorta and connected with a tube leading to reservoirs, placed always at the same height above the frog. The contents of any one of the reservoirs could be caused to flow into the aorta by opening or shutting clamps that were placed on the tubes leading from the reservoirs. The rate of flow of a saline solution through the entire vascular system of the animal was first ascertained, and then a solution of the same saline containing a given quantity of a nitrite was substituted for the simple saline solution, and its rate of flow through the bloodvessels of the animal was ascertained. By this procedure the effects of contact of any strength of a solution of nitrite upon the bloodvessels could be exactly determined; for if the rate of flow were diminished, it would be shown that the bloodvessels had been caused to contract, whereas, if the rate of flow were increased, it would be shown that the bloodvessels had been caused to dilate. The nitrites that were tested were nitrite of amyl, nitrite of ethyl, and nitrite of sodium. Without entering into details, I will content myself with stating that the general result was that each of these nitrites produced by contact a decided dilatation of the bloodvessels, in a few instances so great that the passage through them of the solution was



doubled in its rate; and that dilatation occurred, usually, in less than a minute after the nitrite had entered the bloodvessels, and was continued for periods varying from thirty to ninety minutes. Nitrite of sodium was found to be the least powerful, and nitrite of amyl the most powerful dilator of bloodvessels, nitrite of ethyl occupying an intermediate position. The difference is indicated by the statement that whereas a solution of 1 in 100,000 of nitrite of amyl was sufficient to cause a marked increase in the rate of flow through the bloodvessels—indicating a distinct dilatation of their walls—it was necessary to employ a solution of 1 in 10,000 of nitrite of sodium to produce a nearly equal effect.

The action of nitroglycerine was not examined in the same manner, as the conditions probably required to effect its conversion into a nitrite, which exist in the blood of a warm-blood animal, could not be obtained in the saline solutions substituted for the blood in these experiments.<sup>1</sup>

A few experiments were, however, also made with alcohol and chloroform. Somewhat concentrated solutions of the former produced dilatation; but no constant results were obtained with chloroform, the evidence, on the whole, pointing to an absence of any dilatation under the contact of this substance with the bloodvessels.

It was thus shown that very dilute solutions of nitrites, apart altogether from any influence they may exert on structures at a distance, produce dilatation of the walls of bloodvessels as a result of contact with them. If they could be shown likewise to modify in asthma the condition of the bronchial tubes, whose anatomical relationships to bloodvessels are so marked, it is obvious that an important step would be gained in deciding which of the theories of the causation of the asthmatic paroxysm is the correct one. In the absence of any direct experimental method for ascertaining the state of the bronchi, and especially for estimating the changes that might be produced in them by medicinal agents, during an asthmatic paroxysm, it seemed to me that the observation of the auscultatory phenomena, which have, by nearly universal consent, been explained by stenosis of the bronchi, would be likely to supply important evidence.

My first observation was made in 1880, on a patient, Jessie L., twenty-two years of age, suffering from asthma and from excitement of the circulation and slight enlargement of the thyroid gland. She was one of three sisters who presented, in various forms, the symptoms of exophthalmic goitre. The dyspnoea had lasted for several weeks; it was most severe at night, but occasionally manifested itself during the day. When the observation was made (August 14, 1880) she was sitting up in bed suffering from great breathlessness. The pulse was 100 and the respira-

<sup>1</sup> Since this sentence was written, Dr. Atkinson, in the course of an elaborate research on nitrites, made in my laboratory, has found, in experiments similar to those above described, that nitroglycerine in very dilute solutions powerfully dilates the arteries and capillaries. This local action of nitrites has also been recently shown to occur in warm-blooded animals by R. Kobert (*Ueber die Beeinflussung der peripheren Gefäße durch pharmakologische Agenten. Archiv für experimentale Pathologie und Pharmakologie, Bd. 22, 1886, p. 77.*)

tions 28 per minute. On auscultating the front of the chest, it was found that expiration was markedly prolonged, and that both inspiration and expiration were accompanied with cooing, whistling, and creaking râles, and with occasional medium crepitations.

At 1 55' P.M. she began to inhale 10 minims of nitrite of amyl placed on blotting-paper at the bottom of a small glass tumbler, and she continued inhaling for about one minute and fifty seconds, the chest being continuously auscultated during the observations.

At 1 56' 30", the face was flushed, and the pulse was 120 per minute.

At 1 57', the cooing, whistling, and creaking râles had entirely disappeared, and the patient spontaneously remarked that her breathing was easier, and that the sensation of tightness had disappeared from the chest.

At 1 58', the râles had returned, but as yet to only a slight extent; the breathing had become more difficult, and the pulse was 96 per minute.

At 2 4', the pulse was 96, and the respirations 28 per minute, while the breathing was as difficult, and the râles as loud and continuous as they had been before the inhalation.

From 2 6' to 2 7' she again inhaled nitrite of amyl.

At 2 6' 30", the face was flushed.

At 2 6' 45", the flushing had increased, the râles in the chest had entirely disappeared, and the patient stated that the breathing was perfectly easy.

At 2 6' 50", the pulse was 122, and the respirations 30 per minute, while the breath sounds were still unaccompanied with râles.

At 2 9', cooing sounds were occasionally heard.

At 2 11', the cooing sounds continued, but the breathing was still easy.

At 2 12', the breathing was embarrassed, and cooing, creaking, whistling, and crepitant râles were audible, though they were not so continuous as immediately before the second inhalation.

At 2 19', the pulse was 95, and the respirations 30, while the auscultatory phenomena and the difficulty of breathing were as pronounced as before the administration of nitrite of amyl.

From 2 22' to 2 23' she, a third time, inhaled nitrite of amyl.

At 2 22' 30", the face was very red.

At 2 22' 50", the pulse was 126, and the respirations 23 per minute, while the râles had entirely disappeared, and the breathing was again, in her own words, "quite easy."

At 2 25', the pulse was 90, and the respirations were 28 per minute; the redness of the face had completely disappeared, the breathing was slightly embarrassed, and cooing and creaking râles were occasionally heard.

At 2 28', the breathing was as much embarrassed as it originally had been; and with the return of dyspnœa there was a complete return of the auscultatory phenomena that had been present before the first inhalation of nitrite of amyl.

There had been no cough or expectoration from the commencement to the termination of the observations. The patient stated that the breathlessness and sense of tightness in the chest had been entirely removed for a time by the inhalations, and the only unpleasant effect they seem to have produced was a briefly lasting sense of fulness in the head.

To illustrate more clearly the relationship between the effects on the

asthma and on the circulation, I would refer to the pulse-tracings taken frequently during the observations. They show, in a very remarkable manner, a coincidence between the fall of blood tension and the cessation of the dyspnœa and auscultatory phenomena, and also between the return to the original state of the blood tension and the reappearance of the dyspnœa and auscultatory phenomena. As the lowered blood tension is accompanied with acceleration of the heart's contractions, it can only be accounted for by the dilatation of bloodvessels.

FIG. 1.



Before first inhalation. Pulse 100, respirations 28 per minute. Breathing much embarrassed, râles abundant.

*Nitrite of Amyl Inhaled during nearly Two Minutes.*

FIG. 2.



Two minutes after inhalation commenced. Pulse 120 per minute. Breathing quite easy. No râles.

FIG. 3.



One minute after inhalation ceased. Pulse 96 per minute. Breathing slightly embarrassed. Râles occasionally heard.

FIG. 4.



Seven minutes after inhalation ceased. Pulse 96, respirations 28 per minute. Breathing embarrassed. Râles nearly continuous.

*Second Inhalation of Nitrite of Amyl during Two Minutes, begun Nine Minutes after the first Inhalation ceased.*

FIG. 5.



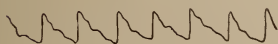
Fifty seconds after second inhalation commenced. Pulse 122, respirations 30 per minute. Breathing perfectly easy. No râles.

FIG. 6.



Two minutes thirty seconds after second inhalation ceased. Pulse 96, respirations 28 per minute. Breathing easy. Occasional râles.

FIG. 7.



Eight minutes after second inhalation ceased. Pulse 96, respirations 30 per minute. Breathing embarrassed. Râles more frequent.

FIG. 8



Twelve minutes after second inhalation ceased. Pulse 95, respirations 30 per minute. Breathing embarrassed. Râles abundant.



*Third Inhalation of Nitrite of Amyl during One Minute, begun Fifteen Minutes Thirty Seconds after Second Inhalation ceased.*

FIG. 9.



Fifty seconds after third inhalation commenced. Pulse 126, respirations 23 per minute. Breathing quite easy. No râles.

FIG. 10.



Two minutes after third inhalation ceased. Pulse 90, respirations 28 per minute. Breathing easy. Râles only rarely.

FIG. 11.



Eighteen minutes after third inhalation ceased. Pulse 88, respirations 28 per minute. Breathing much embarrassed. Râles very abundant.

Several observations were made on other patients suffering from asthmatic dyspnœa, by administering nitrite of amyl or nitrite of ethyl by inhalation. The results generally corresponded very closely with those described in the above observation.

It is apparent that, although the effects are of the greatest significance in regard to one of the main objects for which the observations had been made, they were, at the same time, of a very transient duration. Before any further observations had been made on asthma, I had, however, succeeded in collecting a number of facts which rendered it probable that effects of a more lasting description, and therefore of greater value to therapeutics, might be obtained were the nitrites administered through the mouth. The observations in which this method of administration was followed derive an additional importance from the circumstance that they were made on patients during extremely severe dyspnœa, of a markedly orthopnoëic character. These severe attacks occurred only during the night or the early hours of the morning. The occasions of their occurrence were somewhat irregular, so that it could not be anticipated with certainty that they would occur on any special night. It was, therefore, necessary to entrust the observations to those who could, at any moment, make them. They were kindly undertaken by Dr. Vaughan, who was at the time acting as my resident physician at the Royal Infirmary, and by Mr. Tofft, a clinical clerk in my wards, who remained in the hospital during several nights for the purpose. Both gentlemen had previously assisted me in many observations of this kind, and they were, therefore, thoroughly qualified to undertake the work.

OBSERVATION I.—An interesting and complete series of observations was made on a man, Hugh G., forty years of age, who had suffered from asthma for four years, and had been an inmate of the Royal Infirmary for three months. As one generally finds in cases of so long duration, emphysematous changes had been produced in the lungs, and symptoms of bronchitis were also present. The emphysema was, however, only moderate, and the bronchitis slight, and frequently, for days, the symptoms of the latter were entirely absent. His sputum was usually tenacious and gelatinous, and small in quantity. Several times in each week his sleep was interrupted by severe attacks of breathlessness, which lasted from an hour and a half to three hours, and sometimes occurred twice or even thrice in one night. During the attacks the patient either sits up in bed or walks about the ward, sitting down at times to recover strength. He struggles violently for breath, inspiration and expiration succeed each other rapidly for a short time, then expiration becomes brief, the chest seems to become rigid in full inspiration, violent respiratory efforts are made with but little change in the volume of the thorax, and the extraordinary muscles of respiration are brought into play with but little result. After this state has lasted for some time, endeavors are made to cough, which are at first unsuccessful, but after a number of gasping and strained inspirations and expirations, he at last succeeds in coughing, and by and by a small quantity of frothy and tenacious sputum is expectorated, when the patient either at once or soon after obtains relief. During the greater part of the paroxysm, the face and neck, and to a less extent the chest, are much congested.

OBSERVATION II.—On the 30th of December, 1886, a paroxysm began at about 4 30' A.M. When the patient was examined, eight minutes afterward, he was sitting up in bed holding his sides, and so breathless that he could scarcely speak. The veins of the neck were turgid, and the labored breathing was accompanied with loud wheezing audible in the corridor of the ward at a distance of at least forty yards from the patient. The pulse was 120 per minute and feeble, and the respirations were 36 per minute.

At 4 41', both sides of the chest were auscultated, with the result that the ordinary breath sounds were everywhere supplanted, during both inspiration and expiration, by continuous rhonchi and sibili. The time-relation of inspiration to expiration was 1 : 1½.

At 4 43', five minims of nitrite of amyl in two drachms of water were given to the patient.

At 4 43' 30'', at the left side of the chest, the rhonchi and sibili had markedly diminished; at the right side there were no accompaniments whatever, with the exception of a few medium crepitations at the end of expiration. The face, hands, and chest were distinctly flushed.

At 4 44', the pulse was 96, and fuller, and the respirations were 24 per minute. The patient said that his breathing was greatly relieved.

At 4 45' 30'', the breathing at the right side was absolutely clear and vesicular; and at the left side there was only a slight sibilus during inspiration, expiration being free from accompaniments. The wheezing had by this time practically disappeared.

At 4 50', the time-relation of inspiration to expiration was 1½ to 2½.

At 4 51', there were no accompaniments whatever at any part of the chest either during inspiration or expiration, except a few medium crepitations that occurred at varying intervals and at both sides.

At 4 53', at the right side, the breath sounds continued clear, except that now and then a distant rhonchus was heard at the beginning of expiration; at the left side, however, there were sibili throughout expiration and rhonchi during a part of inspiration.

At 4 55', the patient stated that his breathing had become a little more difficult than it had been a short time before, and he referred the difficulty to the upper half of the sternum.

At 4 58', the pulse was 90 and the respirations were 22 per minute, and the former was irregular in the character of the pulsations.

At 5 A. M., at the right side, there were no accompaniments excepting medium crepitations; and at the left side there was only a brief sibilus, sometimes with inspiration and at other times with expiration.

At 5 8', the patient said he felt perfectly well.

At 5 14', at the right side, there was a short rhonchus at the beginning of expiration, but no accompaniment whatever at the left side. The patient was now lying on the back no longer propped up. He seemed quite free from any difficulty in breathing and he was apparently desirous to be allowed to sleep.

He was again seen at 6 10' when he seemed to be, and expressed himself as being, free from dyspnœa, but on auscultating the chest a few sibili and rhonchi were occasionally heard.

On the following day the patient was very well. His breathing was unembarrassed, but he experienced a little palpitation, and he said he had found it necessary to empty his bladder more frequently than he usually did.

OBSERVATION III.—On the same patient the following observations were made with nitrite of ethyl (nitrous ether).

On the 8th of January, 1887, difficulty of breathing began to be experienced soon after 2 A. M.

At 3 15' A. M., the patient was propped up in bed, breathing with great difficulty and showing signs of much distress. This difficulty was felt both in the act of inspiration and of expiration, but it was rather worse in that of expiration, or, as the patient described it, "it was worse to get the breath out." There was also loud wheezing. A small quantity of sputum had been expectorated, which was tenacious and of a yellowish color.

At 3 20', on auscultation, rhonchi and sibili were heard during inspiration and expiration over both sides of the chest, but rather louder over the right than the left side. The pulse was 96 and the respirations were 22 per minute. The relation of inspiration to expiration was  $\frac{3}{4} : 1\frac{1}{2}$  on both sides.

At 3 26', ten minims of a 25 per cent. alcoholic solution of nitrite of ethyl, mixed with two drachms of water, were taken by the patient.

At 3 26' 30", patient said he was "not so ill."

At 3 28', at both the right and the left sides, there were rhonchi with expiration, sibili had disappeared, and no accompaniments were heard with inspiration. The time-relation of inspiration to expiration was even on the right side, 1 : 1; and on the left,  $\frac{3}{4} : 1$ .

At 3 31', the pulse was 89 and the respirations were 24 per minute.

At 3 35', at both sides, a short rhonchus was heard with inspiration, but nothing with expiration. There was also only slight wheezing, and the patient exclaimed, "I'm almost quite easy now."

At 3 36' 30", both sides of the chest were entirely free from accom-



paniments. The time-relation of inspiration to expiration was at the right side  $1\frac{1}{4} : 1$ , and at the left side  $1 : \frac{3}{4}$ .

At 3 41', the pulse was 72, the respirations were 24 per minute, and the breathing was still quite clear and free from accompaniments.

At 3 51', the patient remarked that he was "quite easy," and had "no difficulty in the least" with his breathing; on auscultation no accompaniments were anywhere to be heard; there was no wheezing; and the time-relation of inspiration to expiration was  $1 : \frac{3}{4}$ . The chest was frequently auscultated from this time until 4.50 A. M., and the breathing was always found to be soft and vesicular in character and to be entirely free from rhonchi or sibili, while during the whole of this time the patient remained entirely free from dyspnœa.

At 4 52', slight wheezing reappeared, the pulse was 72 and the respirations were 20 per minute; and the time-relation of inspiration to expiration was, at the right side,  $1 : 1\frac{1}{2}$ ; and at the left side,  $\frac{3}{4} : 1$ .

At 4 55', at the left side, a slight sibilus was occasionally heard on inspiration, but there were no accompaniments at the right side.

At 5 A. M., the auscultatory phenomena were the same as at the last note, but the wheezing was more audible, and expiration seemed slightly more prolonged. The patient coughed at this time, without expectorating, however.

At 5 11', at the right side, there was slight sibilus at the beginning of inspiration with loud rhonchus during expiration, and at the left side, while inspiration was clear there were rhonchi with expiration. The breathing was now a little embarrassed.

At 5 18', there were a few slight rhonchi and sibili, varying much in the time of their occurrence, at both sides of the chest. The patient at one time said the breathing "is quite easy," and at another that it was "a little difficult." The pulse was 78 and the respirations were 24 per minute. He was, however, lying in a normal position in bed.

These conditions remained unchanged until 5 25', when the observations were stopped.

OBSERVATION IV.—An observation with nitrite of ethyl was again made on this patient, on the 24th of January, 1887. On this occasion, the first symptoms of an asthmatic paroxysm began to show themselves soon after midnight.

At 12 35' A. M. the patient was sitting up in bed, supporting himself on both elbows, and breathing with great difficulty. He stated that this difficulty was more pronounced during expiration than inspiration. There was loud wheezing, audible in the corridor of the ward, at least thirty yards from the patient's bed. A little sputum had been expectorated, consisting of dark masses of a gelatinous substance.

At 12 40', on auscultation, it was found that at the right side there were numerous rhonchi and sibili with both inspiration and expiration; and that at the left side, sibili were almost continuous through inspiration and expiration. The time-relation of inspiration to expiration at both sides was  $\frac{3}{4} : 1\frac{1}{4}$ . The pulse was 79, and the respirations were 30 per minute.

At 12 50', the patient received 10 minims of a 25 per cent. alcoholic solution of nitrite of ethyl in a little water.

At 12 51', he said, "the breathing is easier." At both sides rhonchi were heard during both inspiration and expiration, but there were no

sibili. The time-relation of inspiration to expiration was at the right side  $\frac{3}{4} : \frac{3}{4}$ , and at the left side  $\frac{1}{2} : \frac{3}{4}$ .

At 12 54', the wheezing had become slight. The pulse was 75 and the respirations were 24.

At 12 57', the breath sounds were at both sides quite clear, almost vesicular in character, and entirely free from accompaniments. The time-relation of inspiration to expiration was at the right side  $1 : \frac{3}{4}$ , and at the left side  $\frac{3}{4} : \frac{3}{4}$ .

At 1 A.M. there was no wheezing, and the breath sounds were everywhere vesicular in character. The patient was able to lie down in a normal posture. The pulse was 72, and the respirations were 20 per minute.

At 1 6', at the right side, an occasional slight and distant rhonchus was heard at the end of expiration, and on the left side a similar sound at the commencement of inspiration. Slight wheezing was also audible.

At 1 11', the conditions were the same as at 1 6'.

At 1 14', patient said he felt "quite free" in his breathing. The pulse was 72, and the respirations were 20 per minute.

At 1 18', the patient said the breathing was "soft as if it was oiled." There were no accompaniments on auscultation; the wheezing had quite disappeared; and the time-relation of inspiration to expiration was, on both sides,  $1\frac{1}{2} : 1\frac{1}{2}$ .

The patient was not again examined until 2 A.M. In the interval he had remained perfectly well, and free from any difficulty of respiration. On auscultation, the breathing was everywhere vesicular in character and without any accompaniment. The pulse was 64, and the respirations were 21 per minute. On the same day at 1 P.M., the breath sounds were also perfectly normal; there was no dyspnœa, and the time-relation of inspiration to expiration was  $2 : 1\frac{1}{2}$ .

OBSERVATION V.—This patient when suffering, on another occasion, from a severe paroxysm of asthma, was treated with nitrite of sodium. The paroxysm began to manifest itself at about a quarter to two in the morning of the 30th of December, 1886.

At 2 54' A.M., he was sitting up in bed in great distress, suffering from a sense of great straining in the epigastrium, and he was wheezing as loudly as before the other observations that have been described. Sputum of a very tenacious character and somewhat blood-stained was being expectorated with great difficulty. The pulse was feeble, intermittent, and extremely varying in volume. Its rate was 84, and that of the respirations 30 per minute. The time-relation of inspiration to expiration was  $1 : 2\frac{1}{4}$ .

At 3 A.M., there were heard on auscultation, at the right side, rhonchi throughout inspiration and expiration; and at the left side, coarse rhonchi with inspiration, and rhonchi and sibili with expiration. Sibili were apparently also being produced in the throat.

At 3 2', ten minims of a 10 per cent. solution of nitrite of sodium, mixed with a drachm of water, were given to the patient.

At 3 3', the right side was almost free from accompaniments, but at the left side there was heard a faint rhonchus at the end of inspiration, and an occasional faint sibilus at the end of expiration. Patient "feels a lot easier."

At 3 4', wheezing was no longer audible, and the patient said he was

"quite easy." The pulse was 84 per minute, still intermittent, but a little fuller. The respirations were 30 per minute.

At 3 6', the time-relation of inspiration to expiration at the right side was  $1 : \frac{3}{4}$ , and at the left side  $1 : 1$ .

At 3 7', the patient said "I feel nothing at all." The breathing was quite soft and subdued at both sides, and there were no accompaniments at all.

At 3 8', there was slight wheezing in the throat, but the breath sounds over the lungs were perfectly normal and vesicular.

At 3 12', the patient was talking quite comfortably, and he stated that he had "no distress whatever."

At 3 13', a small quantity of tenacious sputum was expectorated, which "came quite easy."

At 3 15', the breath sounds were still quite free from accompaniments, except that a few crepitations were heard at the beginning of inspiration over the right lung. The time-relation of inspiration to expiration was at the right side  $1 : \frac{3}{4}$ , and at the left side  $1 : \frac{1}{2}$ .

At 3 17', the pulse was 72 per minute, and rather more intermittent than formerly, and the respirations were 26 per minute.

At 3 20', the patient continues to "feel nothing at all."

At 3 28', the breathing was soft on both sides without any accompaniment. The time-relation of inspiration to expiration was at both sides  $1 : 1$ . The pulse was 79, and the respirations were 25 per minute.

At 3 51', the conditions were the same as at last note.

At 3 53', the breathing was still absolutely clear and soft. The time-relation of inspiration to expiration was at the right side  $1\frac{1}{2} : \frac{1}{2}$ , and at the left side  $1\frac{1}{2} : \frac{1}{2}$ .

At 4 7', the condition of respiration was the same.

At 4 26', the breath sounds were perfectly soft and normal. The pulse was 72, and the respirations were 21 per minute. The time-relationship of inspiration to expiration was at the right side  $1\frac{1}{2} : 1$ , and at the left side  $1 : \frac{3}{4}$ .

The observations were now interrupted until 5 53' A.M., when it was found that slight wheezing was again audible, and that over both lungs occasional and slight rhonchi and sibili were present. The patient stated that about five minutes previously he felt tightness of the chest and wheezing "come on all at once."

At 5 56', there were faint sibili with both inspiration and expiration at the right side, and with inspiration alone at the left side. The pulse was 78, and the respirations were 20 per minute. The time-relationship of inspiration to expiration was at the right side  $1 : 2$ , and at the left side  $1 : 1\frac{1}{4}$ .

At 6 5', the patient said "the breathing is getting tighter," and the breath is "worse to come up than go down." Over both lungs sibili were heard throughout inspiration, and the time-relation of inspiration to expiration was at both sides  $1 : 1\frac{1}{4}$ .

As the asthmatic condition was obviously returning, after an absence of at least two hours and a half, it appeared of interest to determine if the return could be checked and a normal state again produced by a second administration of nitrite. The dyspnœa being as yet but slight, it seemed sufficient to administer only half the original dose of nitrite of sodium.

At 6 8', therefore, five minims of the same 10 per cent. solution, or half



a grain, of nitrite of sodium were given to the patient in a drachm of water.

In less than a minute he exclaimed "its away."

At 6 9', it was found, on auscultating, that all accompaniments had vanished from both sides, the breathing having become perfectly soft. The time-relation of inspiration to expiration had also become altered, for at the right side it was 1:1, and at the left side 1: $\frac{3}{4}$ , showing a diminution in the duration of expiration.

The patient was finally seen at 7 15' A.M. He had continued quite well since he had received the second dose. There had been no wheezing, or sense of tightness, nor any form of difficulty in respiration. On auscultating over both lungs, it was found that the breath sounds were perfectly clear and soft, although a few small crepitations occurred early in expiration at the right side. The pulse was 78, and the respirations were 24 per minute. The time-relation of inspiration to expiration was at both sides 1:1 $\frac{1}{2}$ .

OBSERVATION VI.—While this patient was suffering from a severe attack of orthopnœa, an observation was made on him with nitroglycerine. The attack began at 2 A.M. on a damp and cold night (December 28, 1886). When he was seen at 2 35' A.M. he was sitting upright in bed, holding on to it, and breathing with extreme difficulty, the difficulty being, as he described it, during both inspiration and expiration. There was also a cough which, after great and prolonged efforts, brought up sputa, copious in amount, muco-purulent, stained with blood, and very tenacious. It was found, on auscultation, that loud and continuous sibili occurred in both lungs during inspiration and expiration.

At 2 41', he received two and a half minims of a one per cent. solution of nitroglycerine diluted with a drachm and a half of water.

Almost immediately thereafter he exclaimed, "Oh! it's easier," and the wheezing had almost disappeared in a few seconds subsequently.

At 2 42', inspiration and expiration were in both lungs very much softer, sibili had almost disappeared, slight subdued rhonchus was heard at the beginning of expiration, and there were some crepitations. The pulse was 96, and the respirations were 36 per minute.

At 2 45', at the right side, there was slight rhonchus throughout inspiration, and at the left side short rhonchus at the beginning of inspiration. The pulse was 78, and the respirations 24 per minute.

At 2 47', wheezing had again become audible, an attack of difficult coughing occurred, and the patient stated that the breathing was again tight, but in a few seconds afterwards he said that the tightness had disappeared. The pulse was 77, and the respirations 24 per minute.

At 2 54', the breath sounds were absolutely clear, soft, and vesicular, and without any accompaniment.

At 3 2', while the breath sounds at the right side were perfectly normal, at the left side, there were slight distant rhonchi at the beginning of inspiration and expiration. The patient experienced a little tightness of breathing, but only during a few seconds.

At 3 6', at both sides, there were distant sibili throughout inspiration and expiration.

At 3 10', another attack of violent coughing occurred, when a little sputum was expectorated. The pulse was 86, and the respiration 24 per minute.

At 3 12', there was again marked wheezing, and rhonchi were heard during inspiration and expiration over both lungs.

The observations were continued until 5.35', and they showed a gradually increasing development of breathlessness and of the respiratory accompaniments, but neither attained the severity and urgency which had characterized them before nitroglycerine had been administered.

OBSERVATION VII.—The effects of nitroglycerine were well illustrated in another patient, Thomas H., thirty-six years of age, a well-built, muscular man, a joiner by occupation, whose illness had begun about fourteen weeks before the observation was made. There was no history of hereditary predisposition to asthma, and no personal history of pulmonary disease, with the exception of a single attack of acute pneumonia which had occurred four years previously. The patient referred the origin of the asthma to a "severe cold," following exposure to a heavy rain. A week afterward, the dyspnœa appeared, and paroxysms of asthma occurred regularly every morning at 6 o'clock, and lasted for about three hours. He also had considerable dyspnœa during the greater part of nearly every day, and especially when the weather was foggy, which prevented him from working or going about, but produced no discomfort while he was at rest beyond a sense of tightness and weight in the chest. He was free from cough and had no sputum, excepting when the dyspnœa was present, and at these times his sputum was pretty copious, watery, and frothy. No evidence was obtained of enlargement of the heart; but, although the chest was well formed, the lungs were slightly emphysematous. Expansion was good, expiration was a little prolonged, and, generally, rhonchi and sibili with medium and small crepitations were audible over the greater part of the chest. The patient also suffered from headaches, which occurred in the morning after the commencement of each paroxysm, and usually disappeared toward the afternoon.

The case was, therefore, one in which chronic bronchitis was also present, and on several occasions after the patient's admission into the hospital observations were made while there were no paroxysms of asthma on the influence of nitrites on the symptoms of bronchitis, to some of which I shall afterward refer. The influence of nitrites and the conditions in which the patient was placed in the hospital, appeared to lessen the severity of the asthmatic paroxysms; they became less frequent, the time of their occurrence lost the regularity it had originally possessed, the bronchitis disappeared, and the patient was dismissed on December 26, 1886, apparently cured of both asthma and bronchitis, as he had had no symptoms of either disease for ten days.

After returning to his home in Edinburgh, he remained well until the 28th of December. On that day, although he had not resumed work or undergone any exposure, severe dyspnœa appeared at 3 o'clock in the afternoon and continued until 9 o'clock on the following morning. He, therefore, again came to the hospital, and was readmitted. He remained free from dyspnœa during the afternoon, but toward evening the breathing gradually became difficult, until at about 11 30' P.M. the difficulty had increased to orthopnœa, and the patient was obliged to sit upright in bed, supporting himself with his extended arms.

At 1 12' A.M., the patient was in great distress, feeling, as he said, "like to choke." He stated that the difficulty in breathing was felt chiefly during expiration. He had spat a small quantity of slightly adhesive

sputum. There was loud wheezing, and when the chest was auscultated sibili were heard throughout inspiration and expiration at both sides, completely masking all other sounds. The pulse was 112, and the respirations 30 per minute. The time-relation of inspiration to expiration was 1:3.

At 120', he received five minims of a one per cent. solution of nitroglycerine mixed with two drachms of water. There was a perfect "storm" of accompaniments when the nitroglycerine was given. In less than thirty seconds he said, "I feel a little easier."

At 121' 30", the wheezing was less audible, and at the left side inspiration was almost clear, but there were rhonchi with expiration.

At 123', the breathing was almost clear at the right side, and there was a brief sibilus on expiration at the left side. Patient said he "feels much easier."

At 123' 30", at the right side there were sibili during expiration, and at the left side sibili during inspiration. The pulse was 114, and the respirations were 30 per minute.

At 126', headache came on.

At 127', he expectorated about half an ounce of frothy and slightly tenacious sputum.

At 128', at the right side both inspiration and expiration were vesicular and free from accompaniments, and at the left side inspiration was perfectly clear, but very slight rhonchus occurred with expiration. The wheezing was scarcely audible, and the patient said he was "a great deal easier."

At 131', the pulse was 108 and the respirations were 30 per minute. The patient said the difficulty of expiration was "nothing to speak of."

At 134', the breathing was at times perfectly free from accompaniments, and then for a few seconds sibili or rhonchi were heard on one or other side of the chest. The pulse was 108 and the respirations were 28 per minute. The time-relation of inspiration to expiration was 1:2½.

At 138', the chest was beginning to feel tight, and the wheezing was distinctly audible.

At 142', the breathing had become "a great deal stiffer;" the difficulty, according to the patient, was in "getting out breath." Over both lungs rhonchi and sibili were heard during inspiration and expiration.

At 150', the above sounds were only occasionally heard, and the patient said he "feels as free as ever he was," and his appearance was again that of ease.

At 22', 214', 227', and 244', the auscultatory phenomena continued as at last note. At 214', the pulse was 106 and the respirations were 24 per minute; and at 227', they were 80 and 25 per minute, respectively.

At 258', the time-relation of inspiration to expiration was at the right side 1:1, and at the left side 1½:2½. The character of the breathing was soft, but now and again a brief sibilus was heard, with small crepitations at the end of expiration.

At 315' and 357', the conditions remained as at the last note. At the latter time the pulse was 80 and the respirations were 29 per minute; and the time-relation of inspiration to expiration was, at left side, 1:2.

The patient was now left to himself, apparently free from any obvious sign of dyspnœa, but still, on being asked, confessing to a sensation of slight constriction in the chest.



When he was again seen, at 4 30' and 5 20' A.M., he was sound asleep and breathing quietly and without wheezing.

OBSERVATION VIII.—The last case I shall describe is one which illustrates the close relationship frequently observed between bronchitis and asthma. The patient was a man, James B., fifty-two years of age, presenting the ordinary symptoms of pronounced emphysema and severe bronchitis, and suffering greatly from frequent periodic attacks of dyspnoea and orthopnoea. The bronchitis was manifested by coarse and medium crepitations, continuous rhonchi and sibilations, and severe cough, accompanied with an abundant muco-purulent and frothy sputum. The asthma manifested itself in paroxysms of urgent orthopnoea, occurring during the night and almost every night, and so prolonged that the patient could not obtain sleep, except in the morning and during the day.

On the 8th of January, 1885, one of the usual paroxysms began at 9 P.M. He was seen immediately afterward, when he was sitting up in bed in great distress, with loud wheezing respiration; and it was found that rhonchi and sibili were abundantly present.

At 9 30' P.M., a pulse tracing was taken, the pulse being 64 and the respirations 21 per minute. (Fig. 12.)

FIG. 12.



James B. Before nitrite of sodium. Pulse 64, respirations 21 per minute.

At 9 35', five grains of nitrite of sodium dissolved in one drachm of water, were administered.

Almost immediately afterward the patient felt some peculiar sensations, which he described as "the medicine going all over him and making him feel queer." In the course of a few minutes the dyspnoea was relieved, the rhonchi and sibili had entirely disappeared, and the respiratory movements were more full and more easily performed. The patient soon lay down on the bed and seemed disposed to sleep.

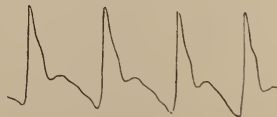
The pulse showed the following characters at thirty minutes, at one hour, and at one hour and a half after the nitrite had been administered. (Figs. 13, 14, and 15.)

FIG. 13.



James B. Thirty minutes after nitrite of sodium. Pulse 76, respirations 20 per minute.

FIG. 14.



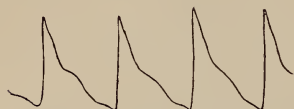
James B. One hour after nitrite of sodium. Pulse 76, respirations 18 per minute.

The chest was frequently auscultated, and it was found to remain free from rhonchi and sibili during two hours succeeding the administration. After this time rhonchi were again heard, but only in a subdued form. The patient, however, was so greatly relieved in his breathing that he

slept whenever he was left undisturbed, and he remained free from dyspnoea all night.

At two hours and at four hours after the administration, the pulse possessed the characters represented in the next tracing. (Fig. 16.)

FIG. 15.



James B. One hour and a half after nitrite of sodium. Pulse 72, respirations 17 per minute.

FIG. 16.



James B. Four hours after nitrite of sodium. Pulse 64, respirations 18 per minute.

On other occasions similar satisfactory results were obtained on this patient with nitrite of sodium and also with nitroglycerine. The latter, however, several times produced severe headache, and, therefore, nitrite of sodium was more frequently given. While five-grain doses of it in a most marked manner subdued the severe paroxysms of dyspnoea—the patient on one occasion stating that he would have died had the medicine not relieved him—it did not cause any headache. At the same time, it was found that the dyspnoea could, in this patient, generally be relieved by one or two grain doses. One administration, but only one out of a considerable number, of five grains was followed by toxic symptoms, consisting mainly of great feebleness of the circulation, which, however, quickly disappeared after the administration of a little brandy.

The administration by the stomach of nitrite of amyl, nitrite of ethyl, nitrite of sodium, and nitroglycerine, therefore, produced the same kind of effect on asthma as that which followed the administration by inhalation of the volatile of these nitrites. A marked, and for therapeutic purposes a very important difference, was manifested in the duration of these effects, which were greatly prolonged by stomach administration.

It has been well recognized that the auscultatory phenomena which have been referred to, are present during the asthmatic paroxysm. It does not appear to have been distinctly appreciated that they are so intimately associated with the paroxysms, that dyspnoea is present only while they are present, and that it subsides or disappears only when they subside or disappear. Not only has this been rendered apparent by the observations I have described, but also by an observation in which the exceptional result was obtained, that a nitrite administered during a severe asthmatic paroxysm, failed to produce more than an insignificant and temporary improvement in the dyspnoea, and equally failed to subdue more than to a slight extent, and for a brief period, the loud rhonchi and sibili that were present.

The observations that have been described further show that both the dyspnoea and the sounds in the chest can be made to disappear simultaneously, or nearly so, by substances whose action is to reduce,

powerfully, the contractility of non-striped muscle. It appears to follow from this that the dyspnœa of asthma is caused by spasm of the bronchial muscles.

The view that this dyspnœa finds its chief explanation in spasm of the diaphragm, associated or not associated with spasm of the ordinary muscles of respiration has, as I have already stated, received so damaging a criticism from Biermer, that its further refutation by such observations as have been brought forward seems to be almost unnecessary. The remaining view to which any importance may be attached, that, namely, of constriction of the bronchial tubes by swellings of a hyperæmic, herpetic or urticaria-like character—whose most prominent upholders are Weber and Sir Andrew Clark—presupposes for the production of the swellings a dilated state of the bloodvessels of the bronchial tubes. The means which I have successfully employed, however, for controlling and checking the asthmatic paroxysm are the very means which should, according to this theory, be the most efficient that could have been selected for increasing the paroxysm and rendering it more prolonged. There is no fact in pharmacology more certain and undoubted than that nitrites produce rapid and great dilatation of the bloodvessels throughout the body.<sup>1</sup> In the first observation I brought forward, and I have others of a like kind, this dilatation was produced at the moment when the dyspnœa disappeared; it was maintained while the dyspnœa was absent; and it gave place to a normal condition of the bloodvessels when the dyspnœa returned. It seems, therefore, to have been abundantly shown that the theory of the production of asthmatic dyspnœa by swellings of the bronchial mucous membrane of a hyperæmic or inflammatory kind can no longer be maintained.

The conceptions of the conditions that immediately produce the asthmatic dyspnœa or orthopnœa, have been obscured by the numerous and unharmonizing theories that have been propounded. If the results of the observations I have brought forward should produce the impression upon others which they have produced upon me, I believe these obscurities will to a great extent disappear, and the old doctrine that the asthmatic paroxysm depends immediately upon spasm of the bronchial muscles, will be more firmly established in the position which it had formerly occupied. At the same time, it is not to be supposed that this doctrine is incompatible with the view that, in a secondary manner, and as a result probably of the dyspnœa which has already been caused by contractions of the bronchial muscles, spasmodic contractions may also be

<sup>1</sup> Although it has not been proved by direct observation that nitrites dilate the bloodvessels on the surface of the bronchi, there is no reason to doubt that they do so; while the facts that these bloodvessels are derived from the aorta and intercostal arteries, and that they possess the same structure as the other bloodvessels of the systemic circulation afford a strong presumption in favor of their being dilated by nitrites in common with the other bloodvessels of this system.



originated in the diaphragm and in other of the ordinary muscles of respiration.

The success in any disease of a therapeutic agent whose action is a known one affords valuable evidence of the correctness of the theory of the causation of that disease. Such evidence appears to be afforded in a very incisive manner by the influence of nitrites in asthma. In this disease many other remedies have also been found to produce benefit. Probably this benefit has been more markedly associated with the inhalation of the smoke of certain solanaceous plants, of nitre, and of several patent medicines in the form of powders, than with any other remedies. The cause of the benefit which these substances produce is, however, almost unknown, and such speculations have been advanced as those of Oertel in his *Treatise on Respiratory Therapeutics*,<sup>1</sup> that the fumes of stramonium and of nitre are beneficial because they stimulate the air passages, giving rise to violent coughing and copious expectoration, and not because they act anæsthetically and antispasmodically on the bronchioles and lungs. Their influence upon the essential phenomena of asthma, and especially upon those phenomena that imply spasm of the bronchial tubes, has not, indeed, been investigated, nor is there much knowledge as to the composition of the patent asthma remedies. The extensive use of these remedies suggests that advantage must be gained from their employment; and it is a common experience to meet with patients who have a greater faith in their power to give relief, than in the arsenic, or iodide of potassium, or lobelia which may be recommended to them by their medical advisers. So much have I been impressed with this circumstance, that I have procured several of these patent medicines for the purpose of having their composition, and the composition of the products of their combustion, determined. This has been done for me by my assistant Dr. Atkinson, with the results noted in the subjoined table.

Arsenic was searched for in all of the preparations, but was not discovered in any of them. Nitrites were not found in the smoke of any of the cigarettes examined; but of the other preparations, in 66 per cent. the products of combustion contained nitrites, and in large quantity in 50 per cent. of them.

While these results supply a sort of confirmation to the value of nitrites in asthma, which the observations that have been described so strongly suggest, it is undoubtedly the case that the best therapeutic effects are not obtained by the inhalation of nitrites, but by their administration through the stomach. The facts that have been stated seem to justify the assertion that their administration in this manner in asthmatic dyspnœa or orthopnœa is entitled to rank as one of the most valuable of the applications of pharmacology to the treatment of disease,

<sup>1</sup> Von Ziemssen's Handbook of General Therapeutics, translated by J. Burney Yeo, M.D., 1885, vol. iii. p. 178.

an application at least as valuable as that in the painful angina of aortic disease, to which nitrites are at present almost restricted.

	BEFORE BURNING: INFUSION MADE WITH WATER CONTAINS			AFTER BURNING: SMOKE CONTAINS	
	Nitrite.	Nitrate.	Pupil dilator.	Nitrite.	Pupil dilator.
1. Maokill's Asthma Cure (Hamilton). . .	None	Distinctly	Distinctly	Distinctly	Distinctly
2. Himrod's Asthma Cure (Himrod Manu- facturing Co.)	"	Abundantly	"	Abundantly	"
3. Hinksman (Carluke) . . . . .	"	Distinctly	"	Distinctly	"
4. Senier's Asthma Remedy (London and Milwaukee.)	"	Trace	"	None	"
5. Green Mountain Asthma Cure . . .	"	"	"	"	"
6. Binning's Asthma Cure . . . . .	"	Distinctly	"	Distinctly	"
7. Girdwood's Patent Asthma Cure (Bel- fast.)	"	"	"	"	"
8. Edward's "Valley Moss" Asthma Cure	"	Trace	"	None	"
9. Ozone Paper (Huggins, London). . .	"	Abundantly	None	Abundantly	None
10. Hockin's Remedy for Asthma and Bron- chitis (Ryde, Isle of Wight)	"	None	Distinctly	None	Distinctly
11. Papier Fruneau contre l'Asthme (Frun- eau, Nantes.)	"	Abundantly	None	Abundantly	None
12. Dr. Palmer's Antiasthmatic Papers (Simpson & Co., Dublin.)	"	"	"	"	"
13. Joyes' Cigares Antiasmaticques . . .	"	Trace	Distinctly	None	Distinctly
14. Argo Cigarettes (Blair, Perth). . . .	"	Faint trace	"	"	"
15. Cigarettes Indiennes (Grimault & Cie., Paris.)	"	None	Trace	"	Faint trace
16. Kay's Stramonium Cigarettes (Stock- port)	"	"	Distinctly	"	Distinctly
17. Dr. Douglas's Maori Cigarettes (Perth)	"	Trace	"	"	"
18. Marshall's Cubeb Cigarettes (Horner, New York.)	"	None	Trace	"	Faint trace

## NEURALGIC HEADACHES WITH APPARITIONS OF UNUSUAL CHARACTER.

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THE peculiar cases of migraine I am about to describe must be excessively rare in either of their varieties, since, with the largest opportunities, I have seen in all but four examples. These are so interesting that they possess a value which sets them quite above the position of mere rarities; perhaps their relation may call forth from others the statement of like cases. In the cases I shall describe, the ordinary subjective images of zigzag lines or rotating wheels were replaced by more definite shapes, so as sometimes to induce the belief for a time, on the part of the patient, that a ghost has been seen. In two persons the vision came as the only visual prodrome of severe headaches. In

another the appearances were various; at times followed the common zigzags, and at others occurred in the intervals between a succession of exasperating headaches. I describe first the lighter cases.

CASE I.—Miss W., æt. thirty, was in good general health and able to bear great fatigue, and to use her mind and body incessantly as a teacher. About once a week for many years she had attacks of migraine of great severity. When nineteen years old she began, just before the headaches, to see a bright gold-tinted cloud, and with it an appearance of parti-colored rain. There was most clouding of vision when the sequent pain was over the right eye, and these visual phenomena were not constant. Somewhat later she had for months permanent headache on the vertex only, and now and then the addition of ophthalmic migraine.

When twenty-eight years old, and still subject to prolonged headache, the attacks changed their type. After a few weeks of freedom, one day, when going up stairs, she was abruptly aware of being accompanied on her left by a large black and very hairy dog. In some alarm she ran into a room and sat down, but still found the dog beside her. Being a woman of courage, she put out her hand to touch it, but could feel nothing, although her ghostly companion was still perfectly visible. At this moment a severe pain began over the left eye, and the dog was gone.

These attacks recurred at intervals, as well as the now ordinary brow pain without the dog vision, but the dog headaches, as she called them, were always the most severe. The visual symptoms left her after some years, but as she went abroad to live, I lost sight of her altogether for a time. I have since heard that in middle life her headaches left her altogether. I should add as a curious detail that nearly always, but not inevitably, the dog appeared as she was going up stairs.

CASE II. is very interesting. Mrs. C., of Arkansas, æt. thirty-eight, mother of four children, consulted me on account of a condition of great prostration which had lasted for years, and was due to exhausting lactation subsequent to excessive hemorrhage at the birth of her last child. She had been a strong and vigorous woman, and with extreme weakness and great anæmia had no organic malady. She had been unusually free from headaches. In the fourth month of her lactation she was dressing in front of a mirror, when she was suddenly aware, as she turned to the left, of the presence beside her, in full daylight, of her sister who had been dead for several years. In great terror she turned to see her, and found that, as she did so, the figure moved, keeping the same relation to her as when first observed. She staggered to the bed and fell upon it. When presently she opened her eyes the figure was gone, and she was at once conscious of a violent pain over the left eye, a pain which lasted for many hours, and wound up with an attack of nausea and a great flow of pale urine.

For some time she was supposed to have had sight of a ghostly visitant. A month later, in her drawing-room with people about her, she again saw the same spectral form, and once more had a headache. Until this sequence occurred several times, she laid the headache to the ghost, and not the ghost to the headache, as she learned to do after the phenomena had been many times repeated. When I saw her she still had migraine, but usually on the right side, and without the spectre, but the rarer left-sided headaches were always preceded by an apparition



of her sister dressed for the street in a bonnet. She thinks that with closed eyes the vision becomes less distinct, but to cover the right eye only makes no difference.

CASE III.—Miss J., *æt.* thirty-eight, of New Hampshire, was one of a family doomed to a variety of grave neuroses. Two brothers died of epilepsy, and two sisters had been insane. Neuralgic headaches were inherited by all of them. At the age of thirty she became hysterical, and for three years suffered with losses of power, spasms, and hemianalgesia. The accustomed headaches went on as usual, but with the addition of one horrible symptom, which was never constant, and, in fact, was rare unless the headache came at her menstrual period. Usually the type was congestive. A slight blur of vision was followed by a neuro-paralytic state of the temporal arteries, flushed face, and within a half hour violent pain over and under one eye, and later in all parts of the head. A rare form of pain preceded the monthly flow, and was ushered in by a ruddy, indistinct spot, like mist, through which, as it grew, she still saw the dim outlines of objects. The attacks were on either side, and the visual phenomena alike. A few months later the red blur took suddenly the form of a near relative, who appeared to her covered with blood, and wearing an expression of profound melancholy. The headache followed the spectral apparition within a few moments, and as it increased with acute pain over either eye the figure faded, but left her for some days with an agonizing desire to kill the person whose image she had seen. As she was profoundly attached to this relative, the conflict between her morbid impulse, which was at times almost uncontrollable and her very distinct sense of the sin of yielding, became most painful to witness. As time went on the apparition became more frequent, and was seen at intervals during the entire period of menstrual flow. Meanwhile her mind grew weaker, and a profound melancholia affected her for two weeks after menstruation, to recur with brow pain and spectral illusion at the next period. At last, after all manner of treatment had been used in vain, both ovaries were removed, with the best possible results. The headaches, hysteria, and spectral appearances left her by degrees. At first, for some months, they occurred in milder and yet milder forms once a month, and at last disappeared. The melancholy lessened, and after a year ceased to exist, and left her in a condition of absolutely perfect health of mind and body.

The last case I have to state is, of all, the most valuable, and of it I have the fullest account.

CASE IV.—E. C., male, *æt.* thirty, of New Jersey, weight 168, not anæmic. Has never had syphilis. The urine is normal, but pale and in excess after an attack. All the organs are healthy, or at least seem to be free from organic disease.

He is a man of active intelligence and has for many years been subject to the incessant strain of a business which clearly overtasks his strength—nevertheless, he sleeps well as a rule. His memory is good and his mind clear for brief work, but he has become increasingly irritable. He is of late years rarely free from pain in some part of the head, but has hemicrania which occurs at intervals of weeks or as far apart as three months, and has existed with ophthalmic symptoms since youth save for a period of fifteen years, its return being consequent to typhoid fever in 1865.

Anger, worry, prolonged use of the eyes in near work are the parents of attacks, or of what we may call the cephalalgic status which lasts two or three weeks and gives rise to one or more acute headaches daily.

The symptoms of onset are these, frontal and occipital sense of tension lessening toward night, good sleep follows, next day he awakens with some pain between the eyes and slight photophobia. The second night, or the morning after it, he is aware of being flushed, but has no cerebral throbbing. In a few moments the lids feel as if pulled toward the inner canthus and fortification zigzags appear, with next partial blurring of vision which seems in twenty minutes to efface the lines and include more or less of the field. The lines seem to be projected one inch from the eye, and flash, and come and go with shimmering prismatic colors. The dimming of vision lasts some twenty minutes and leaves him with slight vertigo and a feeling of fulness of the head, but pain always begins over the eye which has distinct vision, and of this he is sure. It increases as the eyesight clears, and is about one inch above the eye. Exertion, stooping, anxiety increase it. The pain lasts from one to three hours and ceases without nausea. When it occurs over the left eye he has sometimes slight aphasia for five minutes, and in youth this was more severe and more lasting.

As the zigzags fade he has exalted sense of hearing; loud voices hurt him for a half hour, and this is the period of vertigo. At one time he had at this period of the attack tingling in the fingers of the side opposite to that of the pain. After a number of these headaches he is subject to the curious and exceptional illusions which have caused me to report his case. At times these replace the zigzag lines, but later in a series of headaches they come on independent of the hemicrania and occur at night, while awake or in full daylight.

1. A common delusion with him is to see about twenty feet distant a trellis of silver covered with vines and flowers of brilliant tints. This is seen best when the eyes are open, and comes and goes.

2. He sees a series of complex geometrical figures at the centre of the field. These are brilliant pink or red.

3. Quite commonly he sees multiple red circles intertwined and in rapid rotation, and once a red eye which seemed to approach him from a distance. Sometimes there is a milky cascade before both eyes.

4. He saw once a crescent of silver on the wall and suspended from it numerous heads in profile. Some were strange to him and some were vivid revivals of faces which he had long forgotten.

5. Six years ago, he saw, during an attack, a huge red spider, which melted into a series of red rectangles revolving in swift motion.

6. He has several times and first on awaking seen the door open and a procession of white-robed veiled figures enter. They did not fade until he arose and lit the gas. These were seen with his eyes open or shut, and he could not double them by causing himself to squint by pressure on one eye.

At one time for two years he had frequent vertigo without loss of distinctness of hearing. It was apparently of lithæmic origin, and was relieved by careful correction of diet. Of late he has some acidity of stomach after an attack, and is often able to cut off a second headache by a saline cathartic. As the near use of his eyes seemed to be the main cause of trouble, and to be competent to bring about the series of congestive conditions which evolved the phenomena I have described,

I asked Dr. William Thomson to reëxamine his eyes. Briefly, he had no insufficiency, but there was in the right eye hypermetropic astigmatism of three-quarters of a dioptric axis at  $75^{\circ}$ , and in the left myopia of one dioptric and hypermetropic astigmatism of 2.5 dioptric axis at  $100^{\circ}$ . There was no marked gain from any treatment, and I have not seen the case for some time.

Our present state of knowledge, or want of knowledge, makes comment difficult as regards these cases. Why should the zigzag lines or the catherine wheel be so common, and how shall we explain why in rare cases the storehouse of memory sets free for visual projection strange figures long unremembered? The phenomena are not uncommon in disease, but their association as part of the complex symptom, hemi-crania, is undescribed. The connection of epilepsy and prodromic visions I have often seen. Finally, one is tempted to ask if some ghost stories may not arise out of these rare examples of headaches preceded by hallucinations.

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#### ATROPHY OF THE GASTRIC TUBULES: ITS RELATIONS TO PERNICIOUS ANÆMIA.

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As early as 1860 Dr. Austin Flint<sup>1</sup> suggested the probable dependence of the group of cases known as pernicious anæmia upon degenerative disease of the gastric tubules, and ventured to predict that eventually this opinion would be corroborated. Investigations of morbid changes in the mucous membrane of the stomach had previously been reported in England by Drs. Hanfield Jones,<sup>2</sup> Wilson Fox,<sup>3</sup> and Habershon,<sup>4</sup> and in Germany particularly by Dr. F. Schäpfer.<sup>5</sup> They did not consider, however, the marked and different changes found with reference to the anatomical characteristics of any particular disease or diseases.

In 1865 a memoir by Dr. Samuel Fenwick<sup>6</sup> was published on the "Morbid Changes in the Stomach and Intestinal Villi present in Persons who have died of Cancer." The histological changes found by him in

<sup>1</sup> Degenerative Disease of the Glandular Tubuli of the Stomach, *American Medical Times*, September 15, 1860.

<sup>2</sup> Observations of Morbid Changes in the Mucous Membranes of the Stomach, *Medico-Chirurgical Transactions*, vol. xxxvii., 1854.

<sup>3</sup> Contributions to the Pathology of the Glandular Structures of the Stomach, *Medico-Chirurgical Transactions*, vol. lxi., 1858.

<sup>4</sup> Cases Illustrating the Pathology of the Stomach, *Guy's Hospital Reports*, Series III., vol. i., 1853-1855.

<sup>5</sup> Virchow's *Archiv*, vol. vii.

<sup>6</sup> *Medico-Chirurgical Transactions*, vol. xlviii.



many of his cases were very similar to those described by the previously mentioned observers, viz., disappearance of the cells in the gastric tubules, granulo-fatty degeneration and atrophy, and an increased formation of connective tissue. He also noted a marked thinning of the mucous membrane and decrease of its weight. The above changes were more marked in those patients who had suffered from cancer of the breast. He suggested that these alterations in the secretory structures of the stomach offered a possible explanation of the anæmia which accompanies malignant disease.

In 1877 four cases of pernicious anæmia were reported by Dr. Fenwick<sup>1</sup> (including one previously reported by Dr. Hanfield Jones), in which marked and very general atrophy of the gastric tubules was found. The only other cases presenting the clinical picture of progressive pernicious anæmia and associated with atrophy of the gastric mucous membrane, which I have been able to find recorded, are two by Nolen,<sup>2</sup> one by Quincke,<sup>3</sup> one by Brabazon,<sup>4</sup> one by Henry and Osler.<sup>5</sup> Nothnagel has reported a case of cirrhosis of the stomach with the clinical symptoms of pernicious anæmia.<sup>6</sup> In some of these cases the histological investigations lack desirable completeness. During the past two years three cases of pernicious anæmia have come under the author's observation in the wards of St. Luke's Hospital. The patients were carefully observed over very considerable periods of time, and in two of the cases autopsies were obtained.

The histories well illustrate the group of symptoms which have come to be regarded as pathognomonic of pernicious anæmia, and the histological investigations would seem to confirm the opinion which has been expressed by several observers, that "a primary degeneration and atrophy of the gastric tubules occurs," and that extensive destruction of the secretory structures of the stomach may be regarded as causal in a certain number of cases of pernicious anæmia.

CASE I.—J. T., male, aged forty-six, carpenter. Admitted to St. Luke's Hospital April 9, 1886. Family history negative. The patient stated that he had been a moderate drinker; denied venereal disease. For the past five or six years his appetite had been poor, and he had suffered from constipation. He had been troubled with vomiting "off and on" during this period, and thought that he had gradually lost flesh. For the last two years he had had much headache, and occasional attacks of loss or marked dimness of eyesight. Six months ago he began to be troubled with breathlessness on slight exertion, his feet became swollen, and he was obliged to give up work. The dyspnoea persisted, but the œdema gradually disappeared, and he was able temporarily to

<sup>1</sup> Fenwick: London Lancet, 1877, vol. ii.

<sup>2</sup> Centralblatt f. d. medicinische Wissenschaften, Bd. xx.

<sup>3</sup> Quincke: Volkmann's Samml. klin. Vorträge, No. 100 (Case b).

<sup>4</sup> Brabazon: British Medical Journal, 1878, July 27 (without microscopical examination).

<sup>5</sup> Henry and Osler: American Journal of the Medical Sciences, April, 1886.

<sup>6</sup> Nothnagel: Deutsches Arch. f. kl. Med., Bd. 24, p. 353.

return to work. For the past month he has again been worse; he has been very weak and confined to his bed the greater portion of the time.

On admission to the hospital the patient was very weak, and suffered from breathlessness and palpitation on the slightest exertion. There was extreme pallor of the skin of the trunk and extremities, with the peculiar lemon-tint of the skin of the face which obtains very constantly in pernicious anæmia. The ocular conjunctiva was of the latter hue, the palpebral conjunctiva milky white, apparently bloodless, as were the other visible mucous membranes. There was slight œdema about the ankles and puffiness about the eyes, and slight œdema of the skin of the entire body. The heart's apex was in the fifth space, within the mammillary line; a soft systolic murmur was heard over the mitral area, and a similar one over the pulmonary area. There was no evidence of pulmonary disease, and the areas of hepatic and splenic dulness were apparently normal. There was a slightly enlarged gland at the angle of the jaw on each side, sensitive on pressure. The superficial glands elsewhere were not enlarged. There was an absence of external evidence of syphilis. The patient was emaciated; the abdominal walls, however, contained a fair amount of fat. The pulse was 84, and was soft and compressible; there was no appreciable thickening of the walls of the superficial arteries. The temperature (in mouth) was 99.2°. The urine was free from albumen, sugar, and bile pigment. Specific gravity 1.020. Microscopic examination negative. Examination of the blood, April 17th: Number of red globules per cubic millimetre 2,225,000 (5,000,000 normal), hæmic unit therefore 44.5. Proportion of white to red globules 1:130. Percentage of hæmoglobin (estimated by Gower's hæmoglobinometer) 35. The red blood globules were round, oval, and pear-shaped, and many were much larger than normal. Microcytes were present in considerable number; only an occasional Schultze's granule mass was seen. The patient had two rather profuse hemorrhages from the bowels on the day of admission. Arsenic, iron, and daily inhalations of oxygen, with a milk diet, were ordered.

*April 28th.* The patient's condition is very much the same as on admission. Examination of the blood: Number of red blood globules per cubic millimetre 2,451,000, hæmic unit 49. Proportion of white to red 1:123. Percentage of hæmoglobin 40.

*May 21st.* Has steadily grown worse. The enlargement of the glands at the angle of the jaw has disappeared. There is distressing palpitation and dyspnœa on slight exertion. The cardiac murmurs have increased in intensity, and a loud systolic murmur is heard over the vessels of the neck. The first sound of the heart is markedly feeble, pulse 102. Temperature normal. The daily average excretion of urine is 56 ounces. (The patient takes nearly two quarts of milk daily.) Occasionally a trace of albumen is present, but no casts have been found at any time. The daily average excretion of urea is about seven grains to the ounce. Examination of blood: Number of red globules per cubic millimetre 1,067,000, hæmic unit 21.3. Proportion of white to red, 1:107. Ophthalmoscopic examination by Dr. Edward Loring: The fundus of the left eye is hazy and indistinct, the nerve is very pale, the capillary circulation is almost nil; it has the whiteness of atrophy, but appears more woolly. The arteries are reduced in size, and are almost white, with broad white reflex. The veins are increased in size, and are tortuous, carrying their size far into the retina and tapering at the disk. The arteries and veins are of nearly the same color on the

disk; the veins are much darker in the retina. There is no pulsation in either veins or arteries. There is pulsation in both veins and arteries on pressure. There is no general retinitis or neuro-retinitis. There is an absence of white plaques. There is no swelling of the disk. The fundus of the eye presents the same appearance of pallor as the face. The right eye is the same as the left.

*June 19.* The patient's condition is worse. There is gradually increasing œdema of the lower extremities and of the face. Pulse 124 and exceedingly weak; temperature,  $100\frac{2}{3}^{\circ}$ . Complains of a "woolly" feeling in the ears and of dimness of eyesight. Examination of blood: number of red blood globules per cubic millimetre 948,881, hæmic unit 18.9. Proportion of white to red 1:124. Percentage of hæmoglobin 11.5 (the extremely pale tint of the blood may have vitiated the correctness of the color test). The arsenic, the dose of which had been gradually increased, and the iron were discontinued, and caffeine, digitalis, and whiskey (three ounces daily) were ordered.

*27th.* There has been marked improvement in the patient's condition since the last note. The œdema has, to a great extent, disappeared, the pulse is markedly stronger and 96, temperature normal. The patient expresses himself as feeling "a hundred per cent. better." Examination of the blood: number of red globules per cubic millimetre 1,133,750; hæmic unit 22.6. Proportion of white to red, 1:203. Percentage of hæmoglobin 20. Microscopic examination shows similar forms of globules to those previously noted.

*July 7.* The improvement has been maintained. The patient is again taking arsenic and to-day enemata of defibrinated beef blood, eight ounces daily, are ordered in addition. Examination of blood: number of red blood globules per cubic millimetre 2,163,400; hæmic unit, 43.2. Proportion of white to red, 311 red counted, no white seen. Percentage of hæmoglobin 39.

*22d.* Has still further improved. Is able to be up and about and has been absent from hospital on leave on several occasions. The mucous membranes are not as absolutely bloodless as has been the case hitherto. Temperature  $99.2^{\circ}$ . There has been no increase in the patient's weight. The daily percentage of excretion of urea has slightly increased since the administration of the beef blood; the amount of urine voided has maintained its former average. Examination of blood: number of red globules per cubic millimetre 2,072,525; hæmic unit, 41.4; percentage of hæmoglobin 40. The majority of the red globules are certainly larger than normal and many are pear-shaped and oval.

*August 8.* The patient is again worse. There is again great weakness and much œdema. Temperature  $103^{\circ}$ . Examination of blood: red globules per cubic millimetre 1,161,400; hæmic unit 23.2; proportion of white to red 1:288; percentage of hæmoglobin 26.

*September 4.* There is little or no change in the patient's condition. Temperature normal. Examination of blood: number of red globules per cubic millimetre 1,328,450; hæmic unit 26.5; proportion of white to red, 254 red counted, no white seen; percentage of hæmoglobin 33.

*18th.* The patient's condition remains the same. Temperature  $99.3^{\circ}$ . Examination of blood: number of red globules per cubic millimetre 1,351,687; hæmic unit 27; proportion of white to red, 320 red counted, no white seen; percentage of hæmoglobin 30. On this date the patient



was discharged from hospital with the understanding that he should still remain under observation.

He was seen from time to time during the succeeding three months. He was able during the greater portion of this period to be up and to walk moderate distances without much distress. During the early part of December he began to be troubled with diarrhœa, the œdema again became troublesome, he rapidly grew weaker, there was much dyspnœa and palpitation, and on December 21st, he was readmitted to the hospital.

On this date the results of physical examination were much the same as on the patient's first admission to the hospital except that the emaciation was greater. The murmurs heard over the cardiac area and over the vessels of the neck were more intense in character, there was moderate œdema of the lower extremities and of the whole integument. The patient was very weak, pulse 90, temperature normal. The urine was free from albumen, sugar, and bile pigment, specific gravity 1.011, acid.

*Ophthalmoscopic examination* by Dr. Löring. The blood in the arteries is very light colored, and on the disk of a milky appearance. The reflex on the veins is broad and of a white color, as if the walls of the vessels were affected. There are some small decolorized hemorrhages or exudations. There is a marked arterial pulse on pressure. The upper artery becomes blanched on pressure. The vessels in the retina have a waxy appearance, possibly due to changes in their walls. Examination of blood: number of red globules per cubic millimetre 930,000; hæmic unit 18.6; proportion of white to red 1:107; percentage of hæmoglobin 10.

From this date the patient gradually failed, effusion gradually occurred in the pleural cavities, there was vomiting from time to time of matter of the color of chocolate, and death finally occurred on January 19th. Four days previous to death a distinct icteroid tint of the conjunctivæ and skin was developed. The daily average excretion of urea was almost indetical with that noted on the patient's previous stay in hospital. Throughout the whole period of observation there was marked anorexia, but little epigastric distress or vomiting after the ingestion of food, until the last days of life. Milk constituted the principal article of diet.

It was ascertained from the patient's friends, after his death, that he had been a hard drinker for many years.

The autopsies and histological investigations in both cases were made by Dr. Frank Ferguson, the pathologist of the hospital, and to him the author is greatly indebted for the time and labor given to the task.

*Autopsy* twenty-eight hours after death. The body was extremely emaciated, and its surface very anæmic, and slightly jaundiced. There was no œdema. Rigor mortis was present. The muscular tissue of the abdominal wall was anæmic and flabby. The peritoneum was pale, but otherwise normal.

*Pleural cavities.* There were twenty-four ounces of straw-colored serum in each, and there were old adhesions at each apex.

*Heart.* There were eight ounces of straw-colored serum in the pericardium. The heart was slightly increased in size. Its muscular tissue was flabby and anæmic. The heart muscle contained a great deal of fat. The ventricles were dilated; the auricles were also dilated, but to a less degree;

all the cavities contained partially decolorized clots. The valves were normal. The coronary arteries were normal.

*Lungs* were intensely œdematous. The fluid oozing from the cut surface was stained with bile. They were otherwise normal.

*Spleen* was normal in size and firm in consistency, but very anæmic.

*Kidneys* were normal in size, and firm in consistency. The capsules were not adherent, the surfaces were smooth, the markings were not distinct. They were anæmic.

*Suprarenal capsules* were normal in size; the cortex of each contained a great deal of fat. The medullary portion appeared normal.

*Stomach* was moderately distended with gas, and it contained a small amount of dark-colored fluid. It was normal in size, and the calibre of the pylorus was normal. The wall of the stomach, where it was in contact with its fluid contents, appeared thinner than normal. The veins beneath the mucous membrane were unusually prominent. The mucous membrane in the neighborhood of the pylorus was slightly thicker than at the fundus. The surface of the mucous membrane was smooth, and the stomach wall throughout was very anæmic. The œsophagus was normal.

*Pancreas* was anæmic. It was normal in size; it was slightly stained with bile.

*Intestine.* The mucous membrane of the small intestine was covered with mucus. It was anæmic and pigmented. The large intestine was filled with soft feces of a metallic lustre.

*Thoracic duct* was normal.

*Liver* was small, weighing two and three-quarters pounds. It was generally stained with bile. There was much fat arranged around the periphery of the lobules. It was very anæmic. The gall-bladder contained mucus. Its duct was impacted with a black calculus, one inch in diameter. There were other smaller calculi in the common duct, but its muscular wall and mucous membrane appeared normal. The orifice of the common duct was pervious.

*Head and brain.* The calvaria were normal. The brain was intensely anæmic. There was slight atrophy of the convolutions over the vertex of both hemispheres. The Pineal gland was very small. There was an absence of the soft commissure.

*Sympathetic system.* The semilunar ganglia were normal in appearance.

*Marrow.* There was no difference in the color and consistency of the marrow of the long and short bones. In both locations it closely resembled the normal marrow of the short bones. There was no fat in the marrow of the long bones.

**HISTOLOGICAL EXAMINATION.**—*Heart.* Small portions of the muscular wall of the auricles were teased, and considerable fat in small globules was seen in the cardiac cells. The auricles showed an equal degree of fatty degeneration. In fresh sections of the wall of the left ventricle, whole areas of the cardiac muscle were seen in the condition of fatty degeneration. Everywhere the transverse striæ were absent, and the cardiac cells were granular, and many of these appeared like small tubes filled with fat granules. There was an equal degree of fatty degeneration in the walls of both ventricles, and it was more marked than in the auricles.

*Kidneys.* There was a great deal of fat in the convoluted tubes of the kidney. The epithelium was everywhere swollen, granular, and fatty. The fatty degeneration was especially well marked in the cortex. There

was no increase in the fibrous tissue, but numerous small, round cells, of inflammatory origin were seen in the stroma of the organs.

*Adrenales.* There was much fat in circumscribed areas in the cortex of each suprarenal capsule. In some places the proper cortex of the capsules was completely replaced by fat.

*Pancreas.* There was a slight increase in the fibrous tissue of the pancreas. There was considerable fat arranged as follows: 1. A very considerable quantity between the acini, in the planes of the fibrous tissue. 2. There were large globules of fat seen by the unaided eye within the acini. This fat in the recent state was of brownish color, and the globules showed many lines of constriction, as in the process of division and subdivision. 3. The cells of the gland contained very fine granules of fat. The cells were swollen.

*Liver.* There was a great deal of fat in the liver. The fat was more abundant at the periphery of the lobules, but everywhere the hepatic cells contained a large number of fat granules. There was brown pigment in the cells in the centres of the acini. There was bile pigment in all the lobules. The large bile-ducts, which were easily distinguished under the microscope, were normal.

*Ganglia of the sympathetic.* The ganglion cells were deeply pigmented; in other respects the cells were normal. There was no change noticed in the nerve fibres or fibrous tissue.

*Stomach.* The walls of the stomach, including all its coats, appeared so natural that no effort was made to measure their thickness in the fresh state. Any measurements of either the mucous membrane or muscular wall of the organ, after stretching on cork and hardening in alcohol, can only be regarded as useless, since the thickness materially depends on the degree of tension to which the organ is submitted in thus preparing it for microscopical examination. Numerous sections were made of the stomach wall in the neighborhood of the pylorus; at the distance of two, four, six, and ten centimetres above the pylorus, along the greater and lesser curvatures; of the anterior and posterior walls, in the midzone of the stomach; of the different parts of the fundus not in contact with the fluid, and in the neighborhood of the œsophagus, and the following conditions of the mucous membrane were found in all the sections examined. In extensive areas of the mucosa not a trace of the gastric tubules could be seen. In places, however, the most superficial parts of the gastric tubes, lined with cylindrical epithelium, could be distinguished. The deeper portions of the tubules could nowhere be made out. In the recent state the cells lining these remnants of tubules were granular and fatty. There was a large amount of fat in the stroma of the mucous membrane in very fine granules. There was considerable hyaline material, resembling the hyaline casts of the renal tubes. This material was seen in places in droplets, in places having, apparently, the shape of the tubes. Osmic acid did not stain it readily, and ether did not dissolve it. It was slowly stained by Bismarck-brown and the aniline colors. It was dissolved by the prolonged action of ninety-five per cent. alcohol. Numerous cells were seen near the surface of the mucosa, which were irregular in shape, and of the same size as the cells which lined the deeper portions of the gastric tubules. Some of these had undergone hyaline degeneration. Throughout the mucosa everywhere were large numbers of small triangular bodies, slightly larger than pus cells, without nuclei. These were isolated in places, but were more frequently found in groups. They behaved to re-



agents much the same as the hyaline material already noticed. The fibrous tissue of the mucosa was not increased.

In addition to the elements already noticed, the mucous membrane was everywhere infiltrated with the small round cells so common in inflammatory processes.

The only difference noticed between the sections from the various regions of the stomach was that the remnants of a greater number of tubes were seen in the pyloric zone; but nowhere were the secreting structures proper to the stomach noticed. The muscularis mucosæ appeared normal. There was a very moderate amount of fat in the submucosa. The submucosa otherwise appeared normal. The muscular wall of the stomach appeared normal. The vessels were normal.

*Intestines.* Sections of the duodenum, jejunum, ileum, and colon were examined, and no special change was noticed.

*Marrow.* There was no fat in the marrow of the short bones. There were seen in it all the other elements normally found in this location, and also numerous small cells without nuclei, spheroidal in shape, and paler than red corpuscles. Nucleated red corpuscles were not present. A few of the Charcot-Neumann crystals were present. The bone framework supporting the marrow was normal. The marrow of the long bones contained no fat. Small, round, colored corpuscles, similar to those found in the marrow of the short bones, were noticed. Also several Charcot-Neumann crystals.

The tissues of the *eye* were carefully examined, and Dr. Loring has kindly sent the following report:

Beyond a certain dimness of the nervous elements, they appeared normal. There was no increase of the connective tissue either in the nerve or retina. The vessels were normal, arteries as well as veins showing neither thickening nor degeneration of their walls. They contained, however, very little, if any, blood. No red blood-cells were seen in either the retina, the choroid, or ciliary vessels around the nerve. The choroid and sclera appeared normal.

**RÉSUMÉ.—Clinical.** A history of a possibly excessive use of alcohol for many years, of anorexia and gastric disturbance for five or six years, of marked anæmia, and failing health and strength, and of emaciation during the six months previous to the patient's admission to the hospital. The occasional occurrence of hemorrhages, the presence of an irregular temperature curve, gradually increasing emaciation and prostration, with brief periods of improvement while the patient was under observation. Red blood-globules finally reduced to 930,000 per cubic millimetre, the relative percentage of hæmoglobin remaining normal. Megalocytes and poikilocytes in the blood in large numbers, microcytes in considerable number. Death by asthenia, nine months after admission to the hospital.

*Anatomical.* Extreme emaciation and anæmia, fatty changes in all the viscera, an absence of fat in the marrow of the long bones, almost complete destruction of the gastric tubules.

**CASE II.—C. M.**, aged thirty-seven, salesman, was admitted to St. Luke's Hospital July 14, 1886. The patient's family history was nega-

tive. With the exception of an attack of acute articular rheumatism in 1874 and two attacks of gonorrhœa, the last one in 1883, the patient stated that he had enjoyed excellent health until about eight months ago. He denied venereal disease, other than that mentioned above. Periodically, he had used alcohol in great excess. His weight, in December, 1885, was 190 pounds. Four months ago, he began to lose flesh and his appetite and strength became impaired. At this time he was in the habit of taking alcohol, in one form or another, before breakfast. The anorexia increased, until two months later he was unable to take any solid food; forced attempts were followed by vomiting. Gradually great breathlessness and palpitation on slight exertion were developed.

On admission to the hospital, the patient was much emaciated and weak. His weight was 131 pounds. There were marked dyspnœa and palpitation on slight exertion. The skin was extremely pallid as were the visible mucous membranes. The heart's apex was in the fifth space, within the mammillary line; there was an absence of murmurs. There was no evidence of pulmonary disease. The areas of hepatic and splenic dulness were apparently normal. There was slight enlargement of the inguinal and post-cervical glands. There was moderate sensitiveness on pressure over the epigastric region. The pulse was 90, short and compressible. There was no evident thickening of the walls of the superficial arteries. There were no cicatrices on the glans penis or in the groins. The urine was free from albumen, sugar, and bile pigment—specific gravity 1.022.

An examination of the blood was not made until August 14th. On this date the number of red blood-globules per cubic millimetre was 1,862,325, hæmic unit, therefore, 35.2; proportion of white to red globules, 233 red counted, no white seen; percentage of hæmoglobin 30. The red globules were round, oval, and pear shaped. Microcytes were present in considerable numbers.

*August 16.* The area of splenic dulness reaches, anteriorly, the anterior axillary line, indicating apparently an increase in size of the spleen since admission. The enlargement of the inguinal and post-cervical glands remains unchanged.

*24th.* Examination of the blood: Number of red blood-globules per cubic millimetre 1,461,825, hæmic unit 29.2, proportion of white to red, 329 red counted, no white seen.

Poikilocytes are very numerous, megalocytes and microcytes are present in considerable numbers.

*September 14.* The patient's condition has steadily grown worse since admission. The temperature is normal. Examination of blood: Number of red globules per cubic millimetre 1,020,950, hæmic unit 20.4; proportion of white to red not increased. Percentage of hæmoglobin 25.

*28th.* Ophthalmoscopic examination by Dr. Loring. The capillary circulation of the disk is very much reduced. The color of the blood in the veins is very much lighter than normal, corresponding in appearance to arterial blood in the normal eye. The blood in the arteries is lighter than normal. The disk looks atrophic. There are hemorrhages in the upper ascending vein and below the region of the macula, also capillary hemorrhages near some of the veins, and here and there in spots in the upper and outer quadrant of the field. The external borders of both veins and arteries are not clearly marked, the edge

being ragged. There is little or no œdema anywhere, and there is an absence of swelling of the retina.

In spite of every therapeutic measure, the patient continued to fail. No new symptoms were developed, those present on admission simply increased in intensity. There was complete anorexia and the emaciation gradually increased. Physical examination continued to give the same nearly negative results, with the exception of the increase in the size of the spleen previously noted. The temperature was above normal during a portion of the month of August, the curve being very irregular; during the other periods of the patient's illness, there was apyrexia. The average daily excretion of urine was thirty-six and one-half ounces, the average daily excretion of urea was normal. Owing to unavoidable circumstances, the blood was not examined during the month previous to the patient's death, which occurred on October 20th from asthenia. Judging from the extreme pallor of the skin and mucous membranes, from the increased dyspnœa, palpitation, and prostration, the corpuscular poverty of the blood must have still further increased.

**AUTOPSY SEVENTEEN HOURS AFTER DEATH.**—The surface of the body was intensely anæmic. Rigor mortis was present. There was no œdema. The surface of the penis showed no cicatrices.

*Head.* The scalp and calvaria were very anæmic. The brain throughout was normal in consistency, but intensely anæmic. The convolutions were pale and markedly atrophic. There was a great deal of serum in the meshes of the pia mater covering the entire vertex. The vessels at the base of the brain were normal.

There was a very small amount of fat of very pale color beneath the skin, and the muscular tissue in the abdominal wall was of a pale red color. The position of the organs in the abdominal cavity was normal. The peritoneum was anæmic.

*Pleural cavities* contained no fluid, and there were no pleuritic adhesions.

*Heart.* The pericardium was anæmic, and contained two ounces of straw-colored serum. The heart was slightly larger than normal: its muscular tissue was pigmented and anæmic, and contained a great deal of fat. All its cavities were dilated, and contained pale yellowish clots and watery blood. The valves were normal. There was a very small amount of pericardial fat. The coronary arteries were normal. The aorta was normal.

*Lungs* were pale and very œdematous. They were fairly well supplied with air. The bronchial tubes contained frothy mucus and pus. The mucous membrane of the bronchi was intensely anæmic.

*Spleen* was double the normal size. It was normal in consistency, and deeply pigmented.

*Kidneys.* The left was larger than normal. The capsule was not adherent; the surface was smooth and pale; the cortex was swollen; and the markings were very indistinct. The right was normal in size; the capsule was not adherent; its surface was a trifle granular and congested; its markings were indistinct. There was fat in the cortex and pyramids of both kidneys.

*Stomach* contained a small quantity of fluid food. The mucous membrane in contact with the food was macerated, and the veins of the submucosa in the fundus of the stomach were prominent. The mucous membrane of the stomach not in contact with its fluid contents was pale



and smooth, and to the unaided eye appeared normal. The stomach wall, especially that portion of it in contact with the fluid, appeared thinner than normal. The calibre of the pylorus was normal.

The *œsophagus* was normal.

The *pancreas* was normal in size, and anæmic.

The mucous membrane of the *duodenum* was pale, and covered with light colored bile. The orifice of the common bile duct was pervious.

*Liver* was normal in size. The gall bladder was normal. There was a great deal of fat in the liver, and its cut surface was everywhere stained with bile.

*Intestines.* The mucous membrane of the intestines was anæmic throughout. The muscular wall was normal.

*Suprarenal capsules* were normal in size; the cortex of each contained a very great deal of fat.

*Bladder, urethra, and thoracic duct* were normal.

HISTOLOGICAL EXAMINATION.—*Heart.* The muscular tissue in the walls of the auricles was granular and moderately fatty.

The muscle of the right ventricular wall contained a great deal of fat; hardly any of the transverse striæ could be seen, and many of the cells had undergone complete fatty metamorphosis. The fatty degeneration was still more marked in the wall of the left ventricle, where extensive areas of muscular tissue had undergone fatty degeneration, and nowhere in them could the transverse striæ be seen. There was only a trace of fat in the planes of fibrous tissue in the ventricular walls. The bloodvessels were normal.

*Suprarenal capsules.* There were extensive areas of fat in the cortex of each organ. In places the parenchyma of the organs had so completely degenerated that only the stroma could be recognized, infiltrated with fat. Some of these areas of fat were very sharply defined, the cortex in their immediate neighborhood being normal. The medulla of each capsule was normal.

*Kidneys.* The epithelium lining the tubules everywhere had undergone fatty degeneration. The fat was more abundant in the tubes of the cortex and in the collecting tubes. Many of the tubes appeared filled with oil globules of various sizes. There were granular casts in the straight and collecting tubes. The fat was not confined to the tubules, but was seen in very fine globules in the stroma. When hardened in alcohol and stained with carmine, the stroma was seen to contain many small round cells, in places, in aggregations of considerable size.

*Spleen.* The microscopic examination of the spleen was negative.

*Liver.* There was a very great deal of fat in the liver. Very generally the fat was evenly distributed throughout the lobules; some of the lobules, however, were more fatty at the periphery than in the interior. The central vessels were dilated, and the liver cells in their neighborhood were atrophied.

*Brain.* The microscopical examination of the vessels of the brain revealed nothing unusual.

*Sympathetic ganglia.* The ganglia of the sympathetic nerves were normal.

*Stomach.* The mucous membrane of the stomach consisted of a stroma everywhere infiltrated with the small, round cells so common in inflammatory processes. Sections for microscopic examination were made from the pylorus and at varying distances along the greater and lesser

curvatures; and of the anterior and posterior walls, to the level of the fluid within the organ. Extensive areas of the mucous membrane presented no trace of the gastric tubules. In none of the sections were normal tubules found; in several, the more superficial portions of the tubules were recognizable, lined with cylindrical epithelium. The epithelium in the recent state was granular and fatty; small granules of fat were seen in the stroma of the mucosa. There were numerous droplets of hyaline material which was soluble in alcohol when submitted to its action for weeks. It was not readily colored by osmic acid. It did not dissolve in ether, and it stained slowly with the aniline colors. This hyaline material in places took the shape of the tubules. Near the surface of the mucosa there were seen irregular flat cells which might be regarded as coming from the deeper portion of the gastric tubules. These were granular and distinctly nucleated. There were numerous small bodies, many of them triangular, highly refractive, the size of pus cells, seen generally distributed throughout the mucous membrane. In places they were aggregated into colonies. They stained very slowly with the aniline dyes, not at all with osmic acid; were dissolved in alcohol after the lapse of seven to ten days.

The submucosa was normal. The muscularis mucosæ was normal.

The muscular wall of the stomach was normal. The bloodvessels were normal.

The intestines were not examined.

*Marrow.* There was no fat in the marrow of the long or short bones. The marrow in both localities was similar in appearance to the unaided eye, and was the same under the microscope. The absence of fat was the special feature noticeable. There was an absence of multinuclear cells. Several of the Charcot-Neumann crystals were seen in the marrow of both the long and short bones. There were no nucleated red cells seen.<sup>1</sup>

*RÉSUMÉ.—Clinical.* A history of periodical alcoholism; of excellent health previous to eight months before the patient's admission to the hospital; of anorexia and inability to take food for four months; of the symptoms of a gradually developing anæmia and of prostration; of an excessive and rapid loss of flesh. The occurrence of retinal hemorrhages, the presence of an irregular temperature curve; continuous emaciation, and rapidly increasing asthenia during the period of observation. Megalocytes and poikilocytes present in the blood in large numbers; microcytes in considerable number. Red blood-corpuscles finally reduced to 1,020,950; the relative percentage of hæmoglobin remaining normal. Death by asthenia three months after admission to the hospital.

*Anatomical.* Extreme anæmia and emaciation; fatty changes in all the organs; disappearance of fatty tissue in the marrow of the long bones; almost complete destruction of the secretory tubules of the stomach.

<sup>1</sup> Dr. Ferguson, during the past two years, has made histological examinations of more than one hundred stomachs of patients dying of various diseases, and he informs me that in this series he has never observed either the presence in the mucosa of the peculiar hyaline material noticed in the above cases, or a similar extensive destruction of the gastric tubules. Pernicious anæmia was not present in any of the cases of the series.

*Remarks.*—The patients whose histories have been related, presented a clinical picture, in a very typical way, of the group of symptoms which are regarded as pathognomonic of progressive pernicious anæmia.

Both patients gave a history of a probably excessive use of alcohol. The influence of this habit in the production of the pathological process is difficult to determine. In none of Fenwick's<sup>1</sup> cases was there a history of alcoholism; and no mention of it occurs in Nolen's,<sup>2</sup> Quincke's,<sup>3</sup> and Brabazon's<sup>4</sup> cases. On the other hand, the alcoholic habit extended over a period of many years in Henry's and Osler's<sup>5</sup> case, and was regarded by them as "playing a part in the causation of the atrophy." In three out of eleven cases of alcoholism, Hanfield Jones<sup>6</sup> found extensive destruction of the gastric tubules. In Dr. Ferguson's<sup>7</sup> series of one hundred cases, in which a histological examination of the stomach was made, the only considerable degeneration and destruction of the tubules, exclusive of the author's cases, was observed in patients who had suffered from chronic alcoholism.

In both cases the interesting and now well recognized fact in this disease, of a richness in hæmoglobin of the individual corpuscles greatly in excess of that observed in all other forms of anæmia, indeed, equalling that present in health, is clearly illustrated. An increase in the corpuscular richness of the blood and a *proportionate* increase in the percentage of hæmoglobin, corresponding with temporary improvements in the patient's condition, is noticeable in Case I. It will be seen that the average daily excretion of urea was normal, throughout the period of observation, in both cases.

The history in Case I of gastric symptoms, anorexia, and emaciation, distinctly and for a long period *preceding* the appearance of anæmia, and in Case II., the existence of anorexia and inability to take food, with rapid and excessive loss of flesh, also distinctly *antedating* the development of anæmic symptoms, strongly favor the view, from a clinical standpoint, of the *secondary* occurrence of the latter. The pathological considerations in support of the primary nature of the gastric atrophy, will be discussed later. It remains to consider the pathogenesis of the gastric lesion.

That the changes observed in the mucous membrane of the stomach were not due to post-mortem solution or cadaveric change, did not admit of question to the observers. In both cases, all the sections described, were made *above the point of contact* of the fluid in the stomach with the mucous membrane; sections of the lesser curvature and in the immediate neighborhood of the pylorus, showed the presence of changes similar in kind and almost similar in degree to those found in other areas not in contact with the fluid; the mucous membrane above the point of

<sup>1</sup> Loc. cit.    <sup>2</sup> Loc. cit.    <sup>3</sup> Loc. cit.    <sup>4</sup> Loc. cit.    <sup>5</sup> Loc. cit.    <sup>6</sup> Loc. cit.    <sup>7</sup> Not yet published.



contact with the fluid, presented no trace of superficial softening. The more superficial portions of the glandular structure were those least involved, the greatest destruction affecting the deeper portions of the tubules.<sup>1</sup> A post-mortem solution capable of causing such general destruction of the deeper portions of the secretory structures, would very certainly involve the subjacent tissues; and finally there existed a very general infiltration of the mucous membrane with new elements (small cells of inflammatory origin).

Pathological as well as clinical considerations strongly support the view that the very extensive destruction of the gastric tubules cannot be regarded as secondary, and as similar in its origin to the fatty degeneration observed in the other viscera. Extensive fatty changes of the viscera are observed in various chronic non-infectious and acute infectious diseases, with a very moderate degree of fatty degeneration and with little, if any, destruction of the glandular structures of the stomach.

Fatty degeneration of the various tissues of the body is justly regarded in many instances as a consequence of an impediment to, or an arrest of nutrition; *the dense and general small-celled infiltration of the gastric mucosa cannot, however, be regarded as the result of an impaired nutrition, and in itself would account for the degeneration and atrophy of the gastric tubules.*

Gradual destruction of the glandular tissues of the stomach, *consequent* impaired nutrition and fatty changes in the other viscera, would seem to represent the probable sequence in the author's cases.

The supposition of a creeping ulceration in explanation of the gastric lesion is untenable. That the degenerative changes were not dependent upon an arterio-sclerosis or endarteritis, is evident from the absence of appreciable change in the gastric vessels.

Hanfield Jones,<sup>2</sup> as a result of his extensive histological investigations, first expressed the opinion that in some instances "the gastric tubules undergo spontaneous degeneration, or at least not from atrophic pressure of new formed fibroid tissue," and stated that "the mucous membrane then presented a mere mass of granular and colloid debris, with interspersed fat globules and fatty matter." Other observers, who believe that a primary atrophy of the stomach occurs, maintain that it results from interstitial inflammation alone.

In the author's cases the general and very dense small-celled infiltration of the mucous membrane points strongly to the probable dependence of the atrophy upon an inflammatory process. Other elements observed in the gastric mucosa may be regarded as the probable products of degenerating tissues.

A study of the cases related would seem to justify the opinion pre-

<sup>1</sup> A similar condition was observed by Fenwick, Osler, and others.

<sup>2</sup> Loc. cit.

viously expressed that "a primary atrophy of the gastric mucous membrane occurs, and that in this lesion is to be found an explanation of certain cases of pernicious anæmia."

## A CASE OF SUBCUTANEOUS NODULES IN THE HANDS OF A RHEUMATIC PATIENT.

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Mrs. L., aged thirty-nine, presented herself at the outdoor department of the Glasgow Royal Infirmary in November, 1886, complaining of rheumatism, and of painful subcutaneous growths on the fingers of both hands.

She had an attack of acute rheumatism when thirteen years of age, and a second in September, 1883. Between these two attacks, and since the last one, she has frequently suffered from rheumatic pains in various joints, such as the knees, ankles, wrists, and finger-joints, accompanied by some swelling of the parts, but not with distinct fever, and not confining her to bed, unless occasionally for a day. There is no cardiac murmur. There is nothing in the history to suggest the existence of a syphilitic taint.

The swellings on the fingers began during convalescence from the second attack of acute rheumatism, in September, 1883. According to the patient's statement, they were not at first permanent, coming and going; but they have been present more or less, as they are now, since early in 1884, though they are said to vary in size and in hardness.

They began as flattened elevations of the skin, and the most recent ones present something of that appearance now. But the majority are distinctly circumscribed tumors, some the size of a pea, others the size of a small hazelnut. The larger ones are lobulated, being apparently composed of two or more that have coalesced. A few of them feel soft and elastic, but in none is there any indication of fluctuation; the rest are hard, like cartilage, but none have either a chalky or a bony hardness. During the eight months she has been under observation, it cannot be said that they have distinctly varied either in size or hardness, although she herself is of opinion that they have.

The most striking swellings are on the flexor aspects of the fingers, which, as will be seen in the woodcut (from a photograph by Dr. Macewen), present something of the appearance of a knotted blackthorn stick. There are between twenty and thirty growths on the fingers of

the right hand, and between ten and twenty on the left; it is difficult to state the exact number, owing to the fact that so many have coalesced. They are freely movable on the subjacent structures, but the skin is adherent to all but two of these tumors on the fingers. Over many of



them the skin is thickened, and the superficial layers are rubbed off. Many of them present a dull, whitish appearance, intensified by drawing the skin tightly over them. They are itchy, and sore when rubbed. At times they are quite free from pain, but they are very liable to become painful; and the pain in them is most acute when they are growing, during the prevalence of east wind, and just prior to rainy weather. Putting the hands in cold water always causes pain. They have occasionally bled, as after rubbing them, or after a heavy washing of clothes. They have never suppurated.

A few similar swellings are said to have been seen on the toes, but have disappeared. There are none on the scalp, and none on the ears. The only other situation where a swelling of apparently the same characters is met with is at the right elbow. On the right olecranon there is a prominent swelling, which appears to consist of a deep, hard, bony growth, immovable, and quite different from the above, with a mass of softer material like a bursa over it. Distal to this, there is a small,



movable tumor felt under the skin, to which, however, it is not adherent, and probably of the same nature as the growths above described.

At the knuckles there are smaller swellings, which, however, do not seem to have attracted her attention. They are not like the above, but resemble fusiform enlargements of the sheaths of the tendons, with which alone they move. They are not so circumscribed as those already described, and they have no connection with the skin. They are present on all the knuckles, except those of the little finger and thumb on the right, and of the thumb on the left hand.

There is distinct crepitation felt at the knuckles of the left hand, especially on the flexor aspect, and on the ring finger more than elsewhere. In the sheaths of the flexor tendons, both above and below the annular ligament at both wrists, there is crepitation on movement, and several bodies are felt moving along with the movement of the tendons, but not capable of being pressed from the distal to the peripheral side of the ligament. They resemble the loose bodies sometimes found in this situation, but are less movable and fewer in number.

Various remedies were tried to relieve the pain, the one that seemed of most use being a combination of bromide of potassium and liquor arsenicalis.

The case was shown at the Pathological and Clinical Society of Glasgow in December, 1886, when Drs. Macewen and Newman were appointed, along with myself, a committee for its further investigation. Recently, having obtained the patient's consent, Dr. Macewen removed a mass from the front of the left thumb, and found it to consist of two separate tumors, the one single, the other composed of three that had coalesced. The tumors were adherent to the skin, hard, and distinctly circumscribed, but without any capsule; and in their removal the sheath of the tendon was exposed, but there was no adhesion to it. On section, the tumor was white and glistening, like fibrous tissue.

On microscopic examination we found "that where the tumor has approached most closely to the surface, and is most dense, the papillæ of the skin have become obliterated, and the layer of epithelium attenuated, the stratum corneum being reduced to about one-third of its normal size. In passing from that area, papillæ again present themselves, small in size, and gradually increasing on receding from this centre. Where the papillæ are lost, the bloodvessels have also in the main disappeared. The growth as a whole is made up of connective tissue in various stages of development. In its substance there are scarcely any bloodvessels, but at its periphery the arteries seem to be abnormally numerous, and in many instances their coats are greatly thickened by infiltration with cells, the tunica intima being frequently particularly affected. In one instance, besides accumulation of cells in the intima and in the adventitia, there is a collection of cells dissecting the middle coat, which is

also greatly thickened. Collections of these cells frequently extend to a considerable distance from the vessels, and in many sections they map out the course of the minute vessels in the papillæ of the skin. Glandular tissue and fat are almost entirely absent."

As regards its structure, the most striking feature is the condition of the vessels, from which it might be inferred that the lesion has its origin in them, as if from some irritant carried by the blood.

The close relationship between the origin of these tumors and an attack of rheumatic fever, and the fact that they are now also most painful when she suffers from rheumatic pains in the joints, lead me to believe that they are of rheumatic origin, a belief strengthened by the absence of anything in her past history to suggest a syphilitic taint.

In connection with this case, my attention has been directed to a paper on "Subcutaneous Nodules connected with Fibrous Structures Occurring in Children the subjects of Rheumatism and Chorea," by Drs. Barlow and Warner,<sup>1</sup> and to cases shown at the Clinical Society, London, by Drs. Dyce Duckworth,<sup>2</sup> Stephen Mackenzie,<sup>3</sup> and Kingston Fowler.<sup>4</sup> The case above recorded differs in many respects in its clinical features from those recorded by them, while in its microscopic characters it closely resembles the tumors they examined, with, however, some points of difference. I am inclined, therefore, to agree with Dr. Duckworth when he says that "a more extended study of these cases will show that there are several types or varieties of them." Indeed, since my attention has been directed to the subject, I have been led to believe that subcutaneous nodules on rheumatic hands are more common than one would suppose, from the references made to them in literature, by the fact that I have seen at the Royal Infirmary Dispensary several cases presenting such nodules.

GLASGOW, July, 1887.

## CIRCULAR SUTURE OF THE INTESTINE—AN EXPERIMENTAL STUDY.<sup>5</sup>

BY WILLIAM S. HALSTED, M.D.,  
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AMONG the most brilliant triumphs of modern surgery are those which have attended operations involving laparotomy. We can offer a scientific explanation why many abdominal operations—above all, ovariectomy—should succeed so well even without the use of antiseptics. The

<sup>1</sup> Trans. Internat. Med. Congress, London, 1881, vol. iv. p. 116.

<sup>2</sup> Clin. Soc. Trans., vol. xvi. pp. 52, 190.

<sup>3</sup> Ibid., p. 188.

<sup>4</sup> Ibid., vol. xvii. p. 65.

<sup>5</sup> My experiments were completed April 1, 1887, and in a lecture which I delivered at the Harvard Medical School, April 5, 1887, I gave in substance what I have written for this article.

chief danger of these operations is the development of peritonitis of a septic or purulent nature. Contrary to former beliefs Wegner<sup>1</sup> demonstrated experimentally that the mere exposure of the peritoneum to the air does not cause peritonitis. The recent experiments of Grawitz<sup>2</sup> have shown that the access of the microorganisms of suppuration to the peritoneal cavity does not alone suffice to induce peritonitis. The absorbing power of the peritoneal surfaces is very great and, under favorable circumstances, pyogenic substances are quickly absorbed from the peritoneal cavity without causing suppurative inflammation. In confirmation of the experiments of Grawitz I have inserted pure cultures of the pus organisms, as well as small pieces of suppurating tissue and particles of feces, into the peritoneal cavities of dogs without producing peritonitis.

Accessory causes must be present in order that pyogenic substances may induce purulent peritonitis. These accessory conditions, various as they may be, have in common the attribute that they prevent absorption or removal from the peritoneal cavity of pyogenic substances, more particularly of the bacteria of suppuration.

Without entering into a detailed consideration of these conditions, the following may be mentioned as of especial importance in surgical operations involving the peritoneum: the presence in the peritoneal cavity of blood or other stagnating fluids, the existence of necrotic, wounded, or diseased tissue in connection with the peritoneal cavity, and the presence of some focus from which pyogenic bacteria may enter the peritoneal cavity in larger number or more rapidly than they can be absorbed. It is evident that bacteria, which otherwise would be readily absorbed, may take lodgement and grow, if they find in the peritoneum stagnating nutritive fluids or ulcerated and necrotic tissue. For manifest reasons dead spaces, which play such an important rôle in suppurative inflammations elsewhere, are less likely to be formed in the peritoneal cavity than in most other situations.

The experimental results which have been mentioned and the deductions from them enable us to explain the brilliant success of skilful ovariectomists, even when, like Lawson Tait, they ostentatiously discard the use of antiseptics.

In striking contrast to the results of ovariectomy are those of intestinal suture. Not but that here, too, brilliant successes have been recorded, but the death-rate attending enterorrhaphy has been large, and, in general, the operation, even in the hands of the most skilful surgeons, has been capricious in its results. While admitting that an operation so delicate and so difficult in its technique as enterorrhaphy should be judged not by statistics collected at random from all possible sources, but by the results of individual operators of approved knowledge and skill, it

<sup>1</sup> Wegner. Arch. f. klin. Chirurgie, Bd. xx.

<sup>2</sup> Grawitz: Charité-Annalen, Jahrg. xi.



yet remains true that even from this point of view the results are not satisfactory, although they are such as to encourage further efforts in perfecting the operation.

In the hope that an experimental investigation of the subject of intestinal suture might contribute somewhat to our knowledge of the causes of failure as well as of the conditions of success of enterorrhaphy, I have undertaken during the past winter a series of experiments in the Pathological Laboratory of the Johns Hopkins University, in Baltimore. I wish on this occasion to express my thanks to Prof. Wm. H. Welch, the Director of the Laboratory, for his kindness and advice, and also to acknowledge my indebtedness to Dr. F. P. Mall, Fellow in Pathology of Johns Hopkins University, for his kind assistance in the operations, and especially for calling my attention to many points concerning the minute anatomy of the intestine. Dr. Mall's suggestions were of great value to me.

The experiments were performed upon dogs, anæsthetized usually with morphine and ether; they include sixty-nine circular resections and circular sutures of the small intestine.

The history of the operation of intestinal suture has been described so often and so well that it is not necessary in an experimental study of the subject to go over this historical ground again.

Before describing my experiments, I wish to call attention to certain points relating to the anatomy of the intestinal wall, a knowledge of which is of the utmost importance to the surgeon who performs intestinal suture. In looking through the literature of intestinal suture I cannot find that any one has called sufficient attention, from a surgical point of view, to the structure of the different coats of the intestine, particularly to their physical properties. Indeed, the descriptions in surgical text-books, as well as in monographs and articles treating especially of intestinal suture, and the drawings which are frequently inserted to elucidate the subject, lead me to believe that the current ideas among surgeons are not only incomplete, but absolutely incorrect as regards some important details in the structure of the intestinal coats. If these errors related to matters of only histological interest their practical bearing would be very slight, but my experiments have led me to attach great weight, in the successful performance of enterorrhaphy, to an accurate knowledge of the thickness and physical characters of the sub-mucous coat of the intestine, and I am not aware that the importance of this coat in connection with this operation has hitherto been emphasized.

The old views of Jobert and Lembert as to the structure of the intestinal wall seem to have been adopted by modern surgeons with little or no modification. The peritoneal coat, for instance, is believed to be thick enough and sufficiently strong to hold a stitch, and the existence

of the submucosa, for us the most important coat, has been generally ignored.

A few quotations from recent writers will substantiate these statements. Thus Madelung,<sup>1</sup> in his admirable contribution to intestinal suture, writes, "The needle now penetrates in the usual manner the two ends of the intestine, passing between serosa and muscularis." Reichel<sup>2</sup> insists upon the accurate "adaptation of the two edges of the wound, particularly of the serous coats," and, having described the manner of taking the first row of stitches, continues, "over this comes then the external suture which includes only the serosa." Maydl,<sup>3</sup> Kocher,<sup>4</sup> and many others could be quoted in the same sense to show the prevalence of the idea that intestinal surfaces may be sutured by stitches including only the serous membrane.

I fail, moreover, to find in the writings of Gussenbauer, von Winwarter, Kocher, Czerny, Rydygier, Madelung, Reichel, Maydl, and others the proper importance attached to the inclusion of a portion of the submucosa in suturing the intestine. The following quotations will suffice to show how little importance, from a surgical point of view, has been attached to the submucosa.

Reichel<sup>5</sup> completely ignores the existence of the submucosa when he says, "It is to be recommended in making the internal row of sutures, after carefully turning in the mucous membrane, to stick the needle close in front of the edge of the wound through the serosa and muscularis, and to draw it out at the edge of the wound between the muscularis and mucosa, and on the other border to proceed in reverse order."

Maydl,<sup>6</sup> too, recognizes but three coats, for he writes, "Then the two external, possibly retracted, intestinal coats are to be drawn together by means of several stitches which grasp the entire thickness of the intestinal wall with the exception of the already coaptated mucous coats, whereby serous surfaces when present are brought into broad apposition." Had Kocher appreciated the resistance furnished to the needle on entering the submucosa, he might have explained how perforation into the lumen of the gut is to be avoided, and not merely have said, "The wall of the intestine is not to be punctured in its entire thickness,"<sup>7</sup> and "we passed the stitches according to Lembert through the thickness of the intestinal wall, avoiding, if possible, penetrating the lumen."<sup>8</sup> Czerny, who has for a long time devoted himself earnestly and most usefully to

<sup>1</sup> Madelung: *Arch. f. klin. Chirurgie*, Bd. xxvii. p. 321.

<sup>2</sup> Reichel: *Deutsche Zeitschrift f. Chirurgie*, Bd. xix. pp. 268 and 270.

<sup>3</sup> Maydl: *Allg. Wien. med. Zeitung*, October, 1885, p. 475.

<sup>4</sup> Kocher: *Centralblatt f. Chirurgie*, 1880, No. 29, p. 466.

<sup>5</sup> Reichel: *Loc. cit.*, pp. 269 and 270.

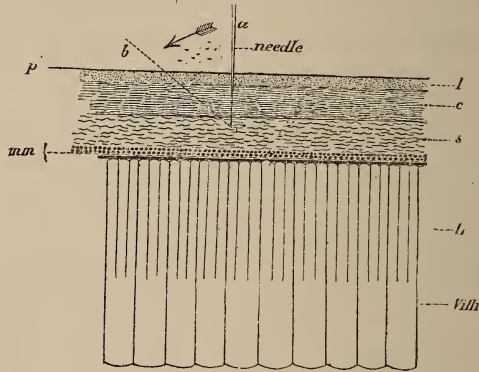
<sup>6</sup> Maydl: *Loc. cit.*, p. 489.

<sup>7</sup> Kocher: *Correspondenzblatt f. Schweizer Aertze*, 1878, p. 155.

<sup>8</sup> Kocher: *Centralblatt f. Chirurgie*, July, 1880, p. 468.

the subject of intestinal suture, does not refer to the submucosa in describing the technique of the operation.<sup>1</sup>

FIG. 1.



*p.* Peritoneum. *l.* Longitudinal muscular coat. *c.* Circular muscular coat. *s.* Submucosa.  
*mm.* Muscularis mucosae. *L.* Glands of Lieberkühn.

Fig. 1, kindly drawn for me by Dr. Mall, is a diagram of the wall of the dog's intestine, and is intended to represent accurately the relative thickness of the several coats. The serosa is prolonged beyond the outer muscular coat to emphasize its thinness. Between the submucosa and glands of Lieberkühn—in other words, between it and the lumen of the intestine—practically nothing intervenes; and, literally, nothing but the two layers of muscularis mucosae and fibrosa mucosae respectively. Fully two-thirds of the thickness of the wall of the intestine is mucous membrane. When the needle, therefore, has been passed through its outer third it must have entered the glands of Lieberkühn and, hence, the lumen of the gut. It is an easy matter to isolate the submucosa. The outer muscular coats strip from it readily, and the mucous membrane can be rapidly scraped off with a knife. Thus obtained, the submucosa is found to be an exceedingly tough, fibrous membrane. It is air-tight and watertight, and is the "skin" in which sausage meat is stuffed. It is, moreover, the coat of the intestine from which "catgut" is made.

A needle, on being pushed vertically through the wall of the intestine, meets with considerable resistance when it reaches the submucosa; and still greater resistance is encountered if it be attempted to pass the needle horizontally through its meshes. A delicate thread of this tissue is very much stronger and better able to hold a stitch than is a coarse shred of the entire thickness of the muscular and serous coats. Upon the discovery of the latter fact, at which I was, perhaps, as much surprised as most surgeons will be at the statement of it, it naturally

<sup>1</sup> Czerny: Berlin. klin. Wochenschrift, November, 1880, p. 641, et. seq.



occurred to me that it would, if feasible, be well to include a portion of the submucosa in the suture. Before attempting this, however, I wished to test the merits of a suture which included nothing but the serosa and muscularis, and I, therefore, performed the following experiment:

EXPERIMENT A.—Small young dog. Operated on January 18, 1887. Irrigation with solution of corrosive sublimate, 1:1000. Needles with *dulled ends* employed for sewing. Circular resection of intestine. Two rows of interrupted stitches passed as deep as, but not including any portion of submucosa—suture of muscular coat. The stitches tore out badly (particularly those of the first row) and had to be frequently retaken.

January 23. Dog found dead. *Autopsy*: Suppurative peritonitis; sutures had given way completely.

Blunt needles were used in the foregoing experiment to enable me to penetrate down to, and no deeper than the submucous coat. Dr. Mall had previously called my attention to the fact that, with the eye-end of a needle, one could not unwittingly puncture the submucosa; for the force required to enter it at all with the rounded end of a needle is sufficient to perforate it, and, that too, not without a positively unmistakable and characteristic jerk. I soon discovered that, even to the sharpened end of a needle, sufficient resistance is offered by the submucosa to be easily appreciable, and that it is possible and, with very little practice, not difficult, to pick up at each stitch a thread-like piece of submucosa without incurring the danger of passing into the lumen of the gut.

Persuaded by Experiment A, and others of a similar nature, that the musculo-peritoneal suture is not to be trusted, I performed Experiments B and C in order to test the advisability of taking up, with each stitch, a thread of the submucosa.

EXPERIMENT B.—Medium-sized dog. Operation January 18, 1887. To include in each stitch a thread of submucosa. Irrigation with solution of corrosive sublimate, 1:10,000. Glass clamps; suture, catgut. Two rows of interrupted stitches.

January 25. Dog has been doing very well ever since the operation.

February 19. Apparently perfectly well. Killed. *Autopsy*: Circular intestinal wound perfectly healed; no adhesions, except slight ones over the line of suture anteriorly.

I wish to call attention here to a point to be emphasized more prominently later, viz., that whereas in Experiments 1 and 2 of Group I., the adhesions were, as we shall see, extensive enough to have eventually caused death in one case, and to have threatened it in the other, in Experiment B they were strikingly trivial.

EXPERIMENT C.—Operation January 20, 1887. To reverse about one foot of intestine. (This operation was done for a purpose not belonging to the subject of this article.) Steps of operation: 1. Complete section of intestine in two places, about one foot apart. 2. Afferent (proximal) ends stitched together. 3. Efferent (distal) ends brought together over the line of suture of afferent ends, and sutured. Straight needles. Two rows of interrupted

silk stitches. With each stitch a thread of submucosa was taken up. Irrigation with solution of corrosive sublimate, 1:10,000.

Dog died of shock a few hours after operation. *Autopsy*, by Dr. Mall: Careful examination of suture made, to ascertain if any of the stitches had penetrated into the lumen of the gut; not one was found to have done so. No peritonitis.

This experiment was a satisfactory one to me, in that it demonstrated the feasibility of carrying the stitches into the submucosa.

To satisfy my curiosity, I made experiments D, E, and F.

EXPERIMENT D.—Small, brindled and white bulldog (pup). Operation January 29, 1887. To suture the submucosa alone. 1. Split muscularis for about two centimetres from cut edges along mesenteric and free borders of intestine. 2. Stripped back the muscular flaps thus marked out and exposed two centimetres of submucosa. 3. Applied two rows of interrupted stitches to the exposed submucosa, appropriating but a thread of it to each stitch. 4. Sewed the musculo-peritoneal flaps together over the line of the circular suture.

January 31. Dog found dead. *Autopsy*: Complete slough of flaps, and gaping of circular wound.

EXPERIMENT E.—Large, long-haired, white dog. Operation January 21st. Circular suture of submucosa alone. 1. Circular division of musculo-peritoneal coat, and stripping off of cuffs to expose about one centimetre of submucosa. 2. Buried-knot quilt (*vide* Fig. 2) stitches applied before completing the section of the gut. 3. Section of gut completed, and buried-knot quilt stitches tied. 4. Two rows of continuous submucosa suture. 5. Cut edges of musculo-peritoneal cuffs turned out, and the under surface of the cuffs coaptated, and held by a few stitches.

February 1. Dog is dead. *Autopsy*: Submucous stitches still hold; but gangrene, starting from the musculo-peritoneal cuffs, extends for about one foot above the circular suture.

EXPERIMENT F.—Operation same as in Experiment E. Dog died of ether.

We are now prepared to consider my first series of operations. In order to classify conveniently the modes of suture, the experiments will not be numbered precisely in the order in which they were performed.

#### GROUP I.—LEMBERT'S STITCHES.

EXPERIMENT 1.—Small, young, black bitch. Operation January 6, 1887. Resection of about two and a half inches of small intestine. Glass-slide clamps. Irrigation with solution of corrosive sublimate, 1:40,000. Suture, fine sublimate silk. Two rows of interrupted stitches.

January 7. Dog walks about. Is not much depressed. Vomits occasionally. Has been seen to pass, per rectum, a few drops of blood-stained mucus.

8th. Dog is playful. No evidence of peritonitis. Takes milk.

11th. Apparently perfectly well.

February 7. Dog emaciated almost to a skeleton. Has refused food for about one week. Is evidently dying of starvation. Killed. *Autopsy*: Line of suture adherent to adjacent intestines. Several acute bends in intestine, two or three inches apart, caused by adhesions. Intestine nowhere dilated. Mucous membrane at the line of suture quite flat.

Riedel<sup>1</sup> relates a similar case, the death of a dog from inanition, due to finger-like bending of the intestine, without dilatation or other evidences of obstruction.

<sup>1</sup> Riedel: Deutsche Gesellschaft für Chirurgie, 1883, p. 25.

EXPERIMENT 2.—Medium-sized, gray dog. Operation January 19th. No antiseptics. Irrigation with warm physiological salt solution. No clamps. Suture, two rows of Lembert's stitches. Fear that too much tissue has been turned in.

*January 25.* Dog has not been very lively since the operation, but takes milk naturally.

*27th.* Dog appears better.

*February 1.* Seems perfectly well.

*2d.* Killed. *Autopsy:* Omentum adherent over line of suture; numerous other adhesions. Intestine, above suture, dilated to about four times its natural size. Suture perfectly firm.

EXPERIMENTS 3, 4, 5.—Operations December 12, 13, and 14, 1886. To isolate loops of intestine. Double circular resection, and double suture. Suture, horse-hair.

All three cases died within two or three days of the operation, from purulent peritonitis.

EXPERIMENT 6.—Young, small, brindled dog. Operation January 9, 1887. To isolate loop of intestine. 1. Intestine divided in two places, about one foot apart. 2. Ends of gut thus isolated, sewed together. 3. The remaining ends stitched together to establish the intestinal continuity. Irrigation with solution of corrosive sublimate, 1:4000. Glass clamps. Suture, fine sublimate silk. Czerny's "Etagennaht." Operation lasted two hours. As the abdominal wall was being sewed, fresh ether was administered, and the dog died of respiratory paralysis. The heart continued to beat for more than fifteen minutes after the respiration had ceased. No attempt was made to revive the animal by artificial respiration.

EXPERIMENT 7.—Small, brindled bitch. Operation January 10, 1887. To isolate loop. Steps of operation the same as in Experiment 6. Czerny's suture. Twenty minutes required for the loop suture, and fifteen minutes for the continuity suture. One hour and fifteen minutes for the entire operation. Dog ceased breathing as abdomen was being sewed. Heart continued to beat. Artificial respiration employed for thirty minutes before active respiration became reestablished.

*January 11.* Dog still alive, and able to walk. No vomiting. Natural stool.

*12th.* Found dead. *Autopsy:* Local peritonitis referable to sutures. Each stitch occupies a focus of pus. Conclude that the silk used may not have been sufficiently disinfected, for it was not placed in the sublimate solution until just before the operation was undertaken.

EXPERIMENT 8.—Rather large, black and white dog. Operation January 8, 1887. To isolate loop of intestine. Irrigation with solution of corrosive sublimate, 1:10,000. Glass clamps. Suture, catgut; Hagedorn's needles. Three rows of Lembert's stitches. Many of the stitches tore out, and had to be reapplied. Some, certainly, perforated into lumen of gut. Expressed myself at the time as being dissatisfied with the operation. Felt sure that the dog would die, because I thought that I had been unusually clumsy in my technique.

*January 9.* Dog lively, and seems well.

*25th.* Dog has not had a bad symptom since the operation.

*February 1.* Not so well.

*3d.* Refuses both meat and drink.

*9th.* Dog is evidently starving to death. Reopen abdomen, find many and very strong adhesions. Both circular sutures firm. The isolated loop is distended to about the size of an inflated human transverse colon, with fecal-smelling, thick, brownish-gray fluid; and its wall is two or three times as thick as normal.

That these cases (Group I.) testify to the defectiveness of my technique, I am eager to admit; at the same time I find no proof that the method of any one else has been otherwise than very uncertain. The single-



resection experiments (Group I.), although they might be called successful, must, when contrasted with Experiment A, and with those which are to follow (Group II.), be regarded with dissatisfaction. The serious adhesions which were present in the former cases, indicate an imperfect method; and in the absence of any such in the latter lies the promise of a better technique. The most favorable accounts of single resections on dogs come from Madelung and Rydygier. The one reports nine, and the other ten experiments as successful.

Studying Rydygier's cases,<sup>1</sup> I observe that, whenever an autopsy was made, extensive adhesions were found, as is evident by the following quotations:

"EXPERIMENT 1. \*\*\* The site of resection is bound by adhesions to the contiguous loops of intestine."

"EXPERIMENT 2. \*\*\* The intestinal loops which lie near to the site of resection, are bound together by adhesions."

"EXPERIMENT 3. \*\*\* The site of resection, which is completely healed, is bound by adhesions to the abdominal wound; furthermore, several loops of intestine are glued together."

"EXPERIMENT 4. \*\*\* The abdominal wound is healed, and the omentum is adherent to it. Several loops of intestine are matted together about the site of the resection, and in separating them the intestinal suture gives way to a slight extent."

Furthermore, of the six unautopsied animals, not one, perhaps, had lived long enough, at the time of Rydygier's writing, to justify the belief that death from adhesions might not ultimately have ensued.

Rydygier's tenth experiment was made September 7th, and on the 10th of October of the same year his article appeared.

We cannot analyze Madelung's work on dogs, because he has not thought it worth while to detail his experiments. In recommendation of his "Knorpelplattennaht," he says:<sup>2</sup>

"I wish to say in its favor, that in the nine experiments on animals in which I performed in this manner circular intestinal and gastric resection, an immediate and complete union took place in every instance. In no instance did escape of feces take place. I do not think it worth while to give a detailed account of these experiments, which were instructive enough to me."

I have no doubt that the results of the gentlemen just quoted, were much better than I could have obtained by their methods as they describe them; for each, with his great experience, must have acquired an *art* of sewing which, from a *scientific* standpoint, is not sufficiently precise to be communicated to others.

To read Kaiser's<sup>3</sup> experiments is to become convinced of the uncertainty with which, in the taking of stitches, he must contend who does not avail himself of the guidance offered by the submucosa.

"EXPERIMENT 1. \*\*\* Autopsy reveals a silk thread projecting into the lumen of the intestine, about which there is a small lens-like depression."

"EXPERIMENT 3. \*\*\* On the stomach, on its inner side, one recognizes the cicatrix in the slightly elevated ridge. On the duodenum, very close to the cicatrix, are two silk ligatures which lead into two small pouches."

The fact that both of these experiments succeeded notwithstanding that, in each, stitches had been passed into the lumen of the intestine or

<sup>1</sup> Rydygier: Berlin. klin. Wochenschr., 1881, p. 593.

<sup>2</sup> Kaiser: Beiträge zur Operativen Chirurgie (Czerny), 1878, p. 142.

<sup>3</sup> Madelung, l. c., p. 323.

of the stomach, makes it more than probable that Kaiser is not the only one who, in spite of an imperfect technique, has had good results.

The experiments of mine to which I particularly wish to invite attention are those of Group II. In all of the operations of this group the plain-quilt submucosa stitches were employed for the complete row; and, in most of them a few presection buried-knot (*vide* Fig. 2 and Group III.) quilt stitches were taken in addition.

## GROUP II. PLAIN-QUILT SUBMUCOSA STITCHES.

EXPERIMENT 1.—Large, black-and-tan dog. Operation January 25, 1887. Double circular suture: to reverse about one foot of intestine.<sup>1</sup> Irrigation with solution of corrosive sublimate, 1:10,000. Glass-slide clamps. Suture. Seven presection stitches in incomplete first row; and ten plain-quilt (post-section) stitches in second row. Intestine well washed with warm water just before being replaced.

January 26. Dog wags his tail, but, otherwise, rather quiet.

February 1. Very lively, and seems perfectly well.

8th. Dog continues to be well.

27th (about five weeks after the operation). Has been losing appetite and spirits for a week or more. Killed. *Autopsy*: Both circular sutures perfectly healed—adhesions not nearly so extensive as in Experiment 8 (Group I.), the successful "Étagennaht" loop case. The further description of the autopsy is reserved for another purpose.

EXPERIMENT 2.—Large, black Newfoundland bitch. Operation February 23th. Double circular suture: to reverse one foot of intestine. Very free irrigation with solution of corrosive sublimate of uncertain strength—probably 1:1000. Suture, sublimate silk. Five presection stitches—one complete row of plain-quilt postsection stitches.

March 2. Dog found dead. *Autopsy*, by Dr. Mall: Absolutely no peritonitis and no adhesions. Lines of suture perfectly firm. Unmistakable evidences of too much irrigation, and with a too strong solution of corrosive sublimate. Ulcers of mucous membrane of stomach. Subperitoneal hemorrhages—particularly over bladder, etc.

EXPERIMENT 3.—Very large, black Newfoundland dog. Operation March 4, 1887. Double circular suture: to reverse one foot of intestine. Irrigation with solution of corrosive sublimate, 1:20,000. Considerable contamination of sutures and intestines with feces throughout the operation.

March 6. Dog so savage that no one can enter the room in which he is confined.

April 1. Dog has not had a bad symptom since the operation.

May 7. Killed. *Autopsy* made by Dr. Welch, who writes me that the dog "was very weak and emaciated, and could not have lived much longer. We found the same condition of things as in the other case.<sup>2</sup> There was a mass of solid material, made up mostly of bits of straw, wood, and hair, which formed a firm impaction, beginning above and extending an equal distance below the upper suture, but not reaching down more than halfway between the two sutures. The intestine was much distended at the seat of the impaction and also, although to a less extent, above the impaction. There were very few adhesions. The peritoneum was clean, and the intestine beautifully healed at the site of the sutures—the inner surface being perfectly smooth."

EXPERIMENT 4.—Moderately large, yellow dog. Operation February 19, 1887. Single circular resection and circular suture. Irrigation with solution of corrosive sublimate, 1:20,000. Suture, sublimate silk. Six presection

<sup>1</sup> *Vide* Experiment C.

<sup>2</sup> Experiment 1, Group II.

buried-knot quilt stitches, and one complete row of postsection plain-quilt stitches.

*February 20.* Dog moderately lively.

*March 11.* Perfectly well. Killed to make injection of liver. *Autopsy:* Suture perfectly healed. A very few slight adhesions.

EXPERIMENT 5.—Large, white dog. Operation March 5, 1887. Single circular resection and circular suture. 1. Application of seven presection buried-knot quilt sutures. 2. Ligation of vessels by circumvection ("Umstechung"). 3. Application of clamps. 4. Section of intestine very close to presection stitches. 5. Tying of presection stitches. 6. Application of plain-quilt stitches (rather *too far* from cut edge of intestine). 7. Tying of plain-quilt stitches.

*March 11.* Dog seems perfectly well. Killed to make injection of vessels of circular suture. *Autopsy:* Slight local peritonitis starting from a small necrotic ulcer (ulcer has not perforated gut wall—is rather superficial) very near the mesenteric border, at line of circular suture. This ulcer proceeded undoubtedly from strangulation where the stitches (both rows) were closest together.

EXPERIMENT 6.—Large, yellow dog. Operation March 8, 1887. Single circular resection and circular suture. Intestine cut very close to presection stitches. Postsection plain-quilt sutures applied nearer than usual to the presection stitches.

*March 25.* Dog has had no bad symptoms since the operation. Killed. *Autopsy:* No adhesions, except a very delicate attachment of omentum to line of suture, anteriorly.

EXPERIMENT 7.—Small, shaggy, yellow dog. Operation March 8, 1887. Single circular resection and circular suture. A few presection stitches: one complete row of postsection plain-quilt stitches.

*March 14.* Dog has made an uninterrupted recovery. Used for a second experiment for another purpose. Killed. *Autopsy:* No adhesions. Circular suture beautifully healed, but so much intestinal wall had been turned in that some obstruction had been caused—manifested by conical dilatation of intestine, and accumulation in it of hay, on the proximal side of the suture.

This case is one of several which indicate that it is not advisable to make two rows of stitches on small dogs.

EXPERIMENT 8.—Very large, brown dog. Operation March 14, 1887. Single circular resection and circular suture. A few presection and one complete row of postsection sutures. Operation performed without an assistant, and without the employment of antiseptics. No clamps. Irrigation with a solution of common salt, 0.6 per cent., at 37° Cent.

*March 25.* Dog has made an uninterrupted recovery. Killed. *Autopsy:* No adhesions—not even of omentum to the line of the suture. A very perfect result.

This operation was performed without any antiseptic precautions, and without an assistant; and yet, as the autopsy showed, the result could not have been more perfect.

EXPERIMENT 9.—Rather large, black and white dog. Operation March 18, 1887. Single circular resection and circular suture. A few presection and one complete row of postsection stitches. Even less attention paid to cleanliness than in the preceding experiment: for the dog was operated upon to furnish situations from which to make drawings. About one foot of intestine was exposed outside of the abdominal cavity for more than two hours; and when returned was very blue and much swollen. But the sewing was very carefully and satisfactorily done.

*April 1.* Dog is very lively, and seems well. Used by Dr. Mall for another



operation. Killed. *Autopsy*: Intestinal wound firmly healed, but the intestines, at the site of the suture, are matted together.

It is not strange that the intestines should, in this case, have been matted together; but rather to be wondered at that, under the circumstances, the dog could have made even such a recovery, indifferent as it appears from our present point of view.

EXPERIMENT 10.—Large, black dog. Operation March 17, 1887. Single circular resection and circular suture. Operation without antiseptics and without clamps. Suture. A few presection and one complete row of post-section stitches. The silk was so very old that it broke often on tying, and many of the stitches had to be retaken. I am quite sure that one—possibly two—of the stitches were passed into the lumen of the gut. More than one foot of intestine allowed to remain outside of the abdominal cavity for one and three-quarter hours. The dog had tapeworm and much feces in his intestine, so that there was a good opportunity for contamination of the wound and of the abdominal cavity. Very free irrigation, during and after the completion of the circular suture, with a warm salt solution—0.6 per cent. Should this case recover, I shall regard it as very strong evidence in favor of my suture.

April 2. Dog lively, and apparently well. Dr. Mall killed the dog, subsequently, and appended the following to the history: *Autopsy*: "No peritonitis. Suture fully healed. A large worm (*eustrongylus gigas*), alive and active, found in the peritoneal cavity."

EXPERIMENT 11.—Rather large, white bitch. Operation February 1, 1887. Single circular resection and circular suture. One complete row of plain-quilt submucosa stitches (*vide* Fig. 7) applied before and tied after resecting about half an inch of intestine. I found the taking of these stitches very easy, but to resect the gut under them was somewhat troublesome. The method, on the whole, is a moderately rapid one—occupying about forty minutes.

February 2. Dog doing nicely.

26th. Dog perfectly well. Killed. *Autopsy*: No adhesions. A most perfect result.

It will be observed that in this (the foregoing) case, as well as in all of the following cases of this group, the incomplete row of presection stitches was omitted; and that but one row of stitches was employed for the circular suture.

EXPERIMENT 12.—Very large, olive-brown dog. Operation February 1, 1887. Resection of two feet of intestine. I made, at first, a circular suture of Emmert's stitches (*vide* Fig. 8); then, being dissatisfied with the appearance of the suture, I again resected the intestine and applied one complete row of plain-quilt stitches.

February 2. Dog convalescent.

3d. Dog lively, and apparently well.

March 9. Still perfectly well. Killed. *Autopsy*: No peritonitis, and absolutely no adhesions.

The intestinal wound had healed so perfectly that its site was only discovered after Dr. Mall and I, in search of the suture line, had run the intestine several times through our fingers.

EXPERIMENT 13.—Small, shaggy, black dog. Operation February 14, 1887. Circular resection and circular suture. One complete row (eighteen stitches) of plain-quilt stitches. Irrigation with tepid salt (0.6 per cent.) solution, and, sparingly, while tying the stitches, with a solution of corrosive sublimate—1:20,000.

*February 15.* Dog is quiet—still affected by morphine.

*16th.* Dog is very playful.

*March 10.* Perfectly well. Killed. *Autopsy:* Circular suture perfectly healed. Slight adhesion of the omentum to the line of the suture.

EXPERIMENT 14.—Very small, old, black and tan bitch. Operation February 21, 1887. Circular resection and circular suture. One row of plain-quilt presection sutures (*vide* Fig. 7). Intestine very small; the smallest, I think, that I have ever sutured.

*March 7.* Dog has been doing fairly well ever since the operation, but has refused food for a day or two.

*March 9.* Found dead. *Autopsy:* No peritonitis. Near the site of the circular suture the gut is found to be much twisted, and bound in this position by adhesions, in themselves very trivial. Above the twist the intestine is very much dilated. Death from ileus. The suture is most beautifully healed, even to mucous membrane inclusive.

EXPERIMENT 15.—Large, brown and white bitch. Operation March 3, 1887. Circular resection and circular suture. One complete row of plain-quilt, postsection stitches. Glass clamps. Irrigation with 1:12,000 corrosive sublimate solution.

*March 14.* Dog has made an uninterrupted recovery. Given to the janitor for a pet.

*June 1.* Dog perfectly well.

Although there were but fifteen experiments in this group, they include eighteen circular sutures of the intestine, all of which were successful. In three instances, about one foot of intestine was reversed, and a double circular suture required. Furthermore, the making of two circular sutures at one time, particularly when accompanied with reversal of a portion of the intestine, increases more than twofold the danger to the animal operated upon.

But what chiefly distinguishes these results, is the *absence of adhesions*. In five of the experiments (2, 7, 8, 11, and 12) there were absolutely no adhesions; nor were there any such in Experiments 6 and 13, save the slight ones between the omentum and the face of the line of the suture. In only one instance were the intestines matted together as described by Rydygier and other surgeons, and as seen by me in so many of my earlier experiments. They who have attempted double circular resection and double circular suture can best appreciate the magnitude of the operation of reversing a portion of the intestine, and can understand, perhaps, my great faith in the suture which has given such results. Experiments 8, 9, and 10 were performed without clamps, without antiseptics—except for the silk, which had been prepared in the usual way—and without especial attention to cleanliness, save that the intestinal wound was diligently washed with a warm salt solution while the stitches were being tied. It may be asked why adhesions should be so strongly objected to. Not so much to the adhesions as such is it objected—although we have seen and already called attention to the fatal consequences of the obstruction which may attend them—as to the imperfect technique which constantly admits of the matting together of the intestines.

Adhesions of this nature imply inflammation; and an inflammation of an extent which, though it may not usually prove disastrous, is always more or less dangerous. The less extensive the inflammation, the greater the certainty that the suture will hold. It cannot, fairly, be urged that time may have swept away the adhesions in my cases, for the autopsies, at which no adhesions at all were found, were made two (Experiment 2), six (Experiment 7), eleven (Experiment 8), twenty-five (Experiment 11), and thirty-six (Experiment 12) days after the operations.

It is believed that the method of operation adopted in the experiments of Group II. combats more satisfactorily than any hitherto suggested the dangers which naturally attend suture of the intestine. The great danger to be apprehended is, as already mentioned, the development of suppurative peritonitis as the result of the operation.

Let us consider for a moment the various factors which during or after the operation of intestinal suture may lead directly or indirectly to the production of purulent peritonitis. In judging of the efficacy of the factors we are guided by the results of the experiments mentioned in the beginning of this article.

In the first place, whence may the pyogenic substances come which are essential to the production of suppurative peritonitis? Evidently either from outside of the body through the wound in the abdominal wall or from the intestine through the wound in its coats. There is, of course, no especial danger of infection of the peritoneal cavity from the exterior in the performance of enterorrhaphy, as compared with other operations requiring laparotomy. This is not a danger, therefore, which needs any especial consideration in this connection or which is to be regarded as serious.

The chief danger of infection of the peritoneal cavity is manifestly from the contents of the intestine, in case they find their way through the wound in the intestine or along the lines of suture. There is a possibility of the escape of intestinal contents at the time of the operation, but this is a danger which can be readily guarded against and one which is much less likely to be attended by serious results than the escape of intestinal contents into the peritoneum subsequent to the operation. Probably too much importance has been attached to the use of antiseptic solutions for irrigation in intestinal resection (*vide* Experiments 8, 9, 10, and 13).

Although in performing enterorrhaphy on the human being I should be unwilling to discard what seems undoubtedly to be an additional precaution, I should, in the light of my experiments, and of several of my operations, hesitate to employ solutions as strong as those commonly advised.

We are brought, therefore, to the conclusion that the chief danger of infection of the peritoneum is from the passage of the intestinal contents



(bacteria) into the peritoneal cavity *subsequent* to the operation. The conditions which may lead to this unfortunate occurrence are 1, failure to close completely and firmly the wound of the intestine; 2, penetration of the intestinal lumen by one or more sutures; 3, giving way of the sutures; 4, ulceration or sloughing of the intestine at the site of suture.

In order to bring about complete and firm closure of the abnormal opening into the intestine it has been customary to make several series of sutures of the intestine one over the other in the form of the so-called "Étagennaht." In this way a considerable extent of the intestinal wall is folded in, the circulation of which is greatly impeded. There are especial dangers which attend the folding in of an unnecessarily large amount of intestinal wall, for, on the one hand, this increases the extent of tissue which undergoes sloughing and thus increases the danger of infection, and, on the other hand, the flange formed by the folds projecting into the intestinal lumen is an obstacle to the passage downward of the feces, which, accumulating at and above the site of suture, increase the tension upon the sutures and endanger their separation.

Experiments will subsequently be described which show that these dangers are not imaginary but real. A sufficiently firm closure of the wound in the intestine with much less danger from the sources mentioned is accomplished by the method adopted in the experiments of Group II., and which will be described subsequently.

Although experiments have already been cited which show the possibility of recovery even when stitches in the final row of sutures have penetrated the lumen of the intestine, nevertheless, it is plain that this penetration of the intestinal lumen is an accident which may lead to serious consequences, and it is to be carefully avoided. While it has been the aim of previous operators to avoid this accident, no definite rules have been laid down by which this is to be accomplished. I wish, therefore, in this connection to lay especial emphasis upon the importance of appreciating, as can be done in the manner already described, the moment when the point of the needle comes into contact with the submucous coat of the intestine. By observing this, it is within our power so to guide the needle that, while including a bit of submucous tissue, it does not penetrate the mucous coat.

Of no less importance in guarding against the third danger of peritoneal infection from intestinal contents, is care that each stitch in the final row shall include a bit of submucous tissue. Utterly misleading is the usual direction, that the stitches shall include only serous membrane, or even serous membrane and muscular coat. Experiment A was given precedence in the list of the experiments described in this article, in order to give prominence to the fallacious character of this direction. Any one, by a simple experiment, can convince himself how frail is the hold of sutures which include only serosa and muscularis. I am inclined

to regard perforation of the gut-wall, on the one hand, and the tearing out of stitches, on the other, as the leading factors in the production of the peritonitis which has brought about the fatal issue in many cases of intestinal suture.

The occurrence of ulceration or necrosis of the intestinal wall at the seat of suture, is a danger which is twofold in its action. It renders possible the escape of intestinal contents, and it affords a soil suitable for the lodgement and growth of bacteria. How important is the latter factor, has been made apparent by the experiments of Grawitz previously cited. Especial dangers attend necrosis of the serous and subjacent coats of the intestine, even when the necrosis does not extend to the mucous membrane; for, doubtless, intestinal bacteria which, otherwise would prove harmless, may reach the diseased tissue and find suitable conditions for their development.

We must not forget that the predisposition to infectious inflammation is necessarily always present in circular suture of the intestine, and lies in the interference with the circulation which the suture causes, but it should be our aim to reduce this predisposition to a minimum. The circular suture disturbs the circulation both directly and indirectly: directly, in so far as the stitches produce constriction of the tissues which they include; and indirectly, in that it bends a portion of the intestinal wall at right angles to its original long axis. To these causes of disturbance of the circulation is to be added the pressure from above of the contents of the intestine upon the flange which is projected into the lumen in the form of the involuted intestinal wall. I am inclined to believe that this projecting flange acts, perhaps, less as a cause of intestinal obstruction than as a factor predisposing to the formation of adhesions, which, to the best of my knowledge, have seldom been absent in the obstruction cases. It has seemed to me that these adhesions have been particularly luxuriant when too much tissue has been turned in by the circular suture.

The results which were obtained in the series of experiments constituting Group II., furnish a sufficient answer to the plea that it is desirable to turn in over a large extent the edges of the intestinal wound, in order to bring as much of the peritoneal surfaces as possible into contact. As has been shown, a sufficiently extensive adaptation of peritoneal surfaces to each other can be accomplished without inverting an excessive amount of intestine, and thus with less impairment of the vitality of the intestine, and consequently less predisposition to peritonitis.

If the turning in of tissue predisposes to too extensive inflammation, perhaps the greatest danger of turning in too much is not that the flap may play the part of a stricture, but that the circulation at the site of the suture may be so much interfered with that union will not take place.

Experiments G and H were made partly to determine if this were so,

and partly to assist in establishing my belief that one could not, with safety, invert as much tissue in small as in large dogs.

EXPERIMENT G.—Very small brown bitch. Operation March 5, 1887. To employ two rows of quilt stitches in suturing the intestine of a very small animal.

*March 9. Died. Autopsy:* Gangrene of inverted edges. No union.

EXPERIMENT H.—Very small, black and tan terrier bitch. Operation March 7, 1887. To employ two rows of quilt stitches in suturing the intestine of a very small animal. Intestine so small that, after the second row of stitches was tied, the gut at the site of the suture looked quite white, especially along the convex border.

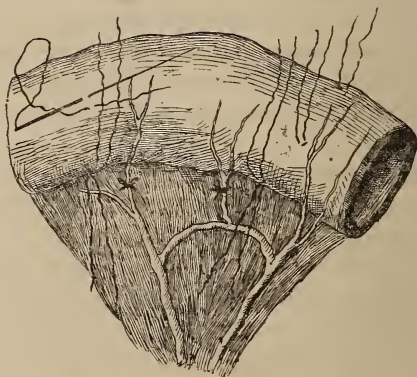
*March 11. Dog not well. Killed. Autopsy:* Gangrene of flap, as expected. Purulent peritonitis.

If two rows of stitches are so dangerous in very small dogs, why use presection stitches even in large dogs?

This question leads us to the consideration of the technique.

TECHNIQUE.—When the gut has been completely divided there ensues, immediately, a spasm of the circular muscle fibres nearest the cut edges, which inverts the mucous membrane, and almost closes the newly made intestinal orifices. The spasm of these fibres lasts but a few seconds: it is succeeded by a relaxation of the same, and by a contraction of the adjacent circular fibres; and now the mucous membrane is rolled out. It is exceedingly troublesome to take the stitches properly when the mucous membrane is thus everted. To relieve myself of this annoyance, I devised and tested various presection stitches, and, finally, adopted the one represented in Fig. 2.

FIG. 2.



Presection, buried-knot quilt half-stitches.

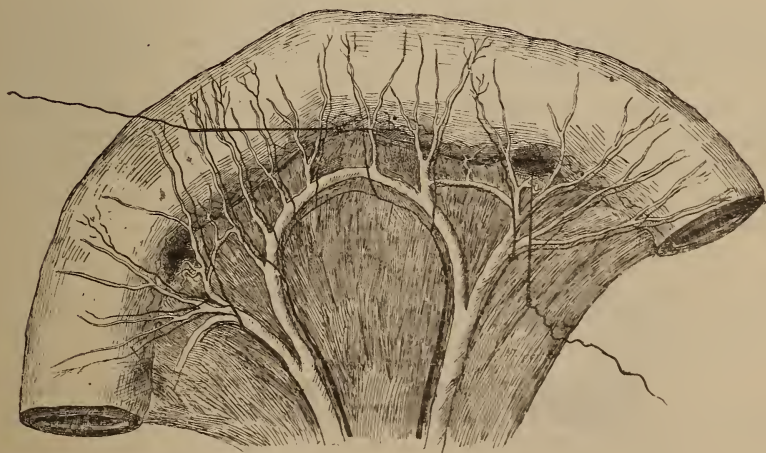
To distinguish it from the other forms of quilt stitch, I have called it the buried-knot quilt stitch.

The four threads, two from each side, are tied at one time, and the knot becomes buried in the folds which have been raised up thereby.



From five to seven presection stitches—ten to fourteen half-stitches—are taken; two of these are at the mesenteric border, one on each side, and just at the attachment of the mesentery. The needle is introduced on a line with one of the radii (*vide* Fig. 1, *a*) of a transverse section of the intestine, and pressed upon gently by the pulp of one finger until the resistance offered by the submucosa is encountered; it is then tilted (*vide* Fig. 1, *b*) through ninety degrees, or until about parallel with the long axis of the gut, pressed on with a little more force than before, tilted still further, and, finally, passed out. It is reintroduced almost, but not precisely, where it emerged (*vide* Fig. 2), passed through in the same manner as before, but in the opposite direction, and its thread divided. The threads of the half-stitches from both sides, when straightened out, naturally cross each other, and lie upon the portion of intestine to be resected. There is an opportunity for the exercise of some discretion in the selection of a spot on the mesenteric border for the introduction of the first stitch. The vessels distributed to the intestine are ensheathed in more or less fat, usually in enough to make the mesenteric border obscure except at certain places between vessels which are rather far apart. These places are often entirely free from fat and, if the mesentery be not pulled upon, are concave.

FIG 3..



Introduction of needle into concavity, free from fat, in taking the first presection stitch.

At the bottom of any one of these little concavities (*vide* Fig. 3) the needle can be introduced with greater precision than it could be at a point where fat obscures the mesenteric border. The first presection stitch (half-stitch), so taken, can be seen through the mesentery, and

serves as a guide for the taking of the corresponding stitch (half-stitch) on the other side.

I sew with what are called milliner's needles. These needles differ from the ordinary cambric needles, only in that they are disproportionately long, and, hence, easier to handle. Nos. 9 and 10 are good sizes for the purpose. Finer sizes cannot be threaded easily. Black silk is preferable to white because it contrasts more strongly with the parts to be sewed. The silk was prepared by soaking it—on the spool—in a solution of corrosive sublimate, 1 : 1000.

When all the presection stitches have been introduced, the vessels of the part to be resected are ligated (*vide* Fig. 2, X) by circumvection with one of the threaded milliner's needles. Then the intestine is divided as close as possible to the presection stitches (*vide* Fig. 4). It is better to

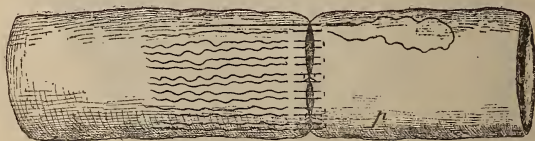
FIG. 4.



Intestine divided close to presection, buried-knot half stitches.

make a circular division of the wall of the intestine than to cut through both walls at once. By cutting rather rapidly one can take advantage of the first muscular contraction, and can complete this part of the operation before eversion of the mucous membrane has taken place. The presection stitches being tied, the eversion of the mucous membrane is prevented and the way prepared for the application of the complete row of what may be called *plain-quilt* stitches (*vide* Fig. 5).

FIG. 5.

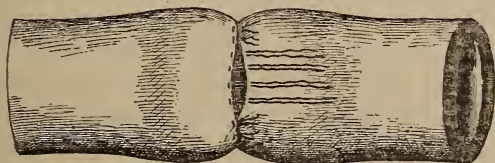


Presection, buried-knot stitches tied ; plain-quilt, post-section stitches introduced.

The plain-quilt stitches include, like the presection stitches, threads of the submucosa, and should be placed a little nearer to the cut edges than Figs. 5 and 6 would lead us to suppose. They should all be applied before a single one is tied. It is impossible to preserve a straight line of application if each stitch be tied as it is taken—the tendency being to depart, in an outward direction, more and more from the

straight line. The distance from each other at which the stitches should be taken cannot be given at once for all of them—so much depends upon the spasm of the circular muscle fibres along the line of, and caused by the taking of the stitches. The contraction does not, as a rule, supervene until several stitches have been taken; but, once set up, it extends in a circle in advance of the stitches, and must be taken into consideration in the application of them. Before the last stitches have been applied the muscular tissue concerned is, frequently, no longer able to respond to the stimulus of stitch-taking, and the intestine assumes its natural size. During the period of muscular contraction the stitches must be applied very close to one another—perhaps one to one and one-half millimetres apart—but before and after this contraction an interval of two to two and one-half millimetres may be left between them. The wall of the gut rolls in of itself as the stitches are tied (*vide* Fig. 6),

FIG. 6.



Intestine after all but four of the plain-quilt stitches have been tied.

and the entire operation can be conveniently performed without an assistant. The threads must not be drawn so tightly in tying as to make the tissue included in the stitch look very anæmic.

In five of my operations (Experiments, 11, 12, 13, 14, 15, Group II.) the incomplete row of presection stitches was not employed; and, although the results justify the belief that it may with safety be omitted, the operation is so greatly facilitated by its use that I should be sorry, without good reason, to discard it.

In no instance was a triangular piece of mesentery excised; nor did I ever sew together the edges of the rent which was always made in the mesentery, for fear of including vessels which might contribute to the blood supply of the sutured parts.

**IRRIGATION.**—The fluid used for irrigation, if neither too strong nor too hot, seemed to have little or no influence upon the results. A solution of corrosive sublimate—1:20,000—was the one commonly employed, and I should prefer a weaker (1:30,000 to 1:40,000) solution to a stronger.

We had the opportunity, repeatedly, to observe the immediate bad effects on the intestine of solutions hotter than 38° Centigrade; and ultimately I became partial to cold or slightly tepid solutions for irrigation,



because, with the use of them, the wall of the intestine did not become so much swollen, and the stitches could, therefore, be applied with greater precision.

I was always especially careful to have the wound freely irrigated during the tying of each knot, and thus precluded the possibility of imprisoning foreign matter between the opposed peritoneal surfaces.

**CLAMPS.**—The intestine was usually clamped with glass microscopical slides of the English pattern; first made to embrace the gut, they were then tied together about their middle by a disinfected string; lastly, a short piece of rubber-tubing was introduced, on the stretch, between the converging ends of the slides; and, by slipping the tubing toward or away from the string, the pressure exercised by the clamp could be diminished or increased. Aside from its simplicity and the readiness with which it can be applied, the clamp has, in addition, this in its favor, that through its glass blades the state of the circulation in the intestinal wall may be watched.

**ABDOMINAL WOUND.**—The incision was always, save once, made in the linea alba, and as near to the pubes as practicable. If it was carried too far in the direction of the xiphoid cartilage, we were annoyed by the protrusion of a fatty flap covered by peritoneum, which seemed to spring from the posterior surface of the lower piece of the sternum and from the upper part of the inner surface of the anterior abdominal wall.

Before cutting through the peritoneum we covered the dog with two large disinfected towels (a procedure suggested by Dr. Mall), and stitched them to the edges of the abdominal wound and, above and below it, to each other.

The abdominal wound was closed usually with two rows of sutures. The first row, made with interrupted stitches of silkworm gut, included everything but the skin. The cut edges of skin were then brought loosely together by a continuous suture taken from its under surface and from the underlying loose connective tissue. The wounds were dressed with horsehair taken from a corrosive sublimate solution, 1:1000, and were bandaged with crinoline.

**PREPARATION AND CARE OF THE DOGS.**—Only one of the dogs operated upon (Exp. 3, Group II.) was dieted before the operation, or isolated after it. The dogs were frequently fed on the day of the operation, and were always allowed to run about, all together in a large room, as soon after it as they might be inclined. Milk was given to them as soon as they would take it, but solid food was withheld for about one week.

**ANÆSTHETICS.**—Morphine, hypodermatically (5i-3iv of a five per cent., solution), followed by a few inhalations of ether.

Neither Neuber's intestinal tubes nor any other similar contrivances

were made use of to simplify the performance of circular suture of the intestine; because, 1, they were not believed to be necessary; and 2, it was thought that they would increase the danger of the operation.

The employment of an incomplete row of buried-knot presection stitches facilitates the application of the subsequent complete row quite as much as does the use of the Neuber's tube. Furthermore, when a Neuber's tube is used, an incomplete row of post-section stitches must be taken; and, as we have repeatedly said, the application of first row *postsection* stitches is troublesome, whereas it is easy to apply presection stitches.

I believe that when the circular suture is made over a tube of any kind the circulation in the immediate neighborhood of and along the line of suture is additionally obstructed. And should the tube slip to the slightest extent out of place, or soften too quickly, the circular intestinal wound may leak; for I have repeatedly observed that a suture which answered the purpose over a tube failed to close the wound sufficiently when the tube was removed.

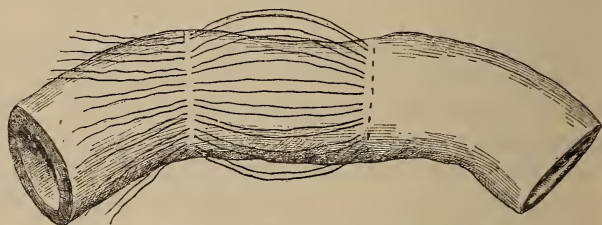
THE PREPARATION AND PRESERVATION OF THE NEEDLES.—Madelung and other surgeons have called attention to the fact that, in order to save time at the operation, it is well to have the needles threaded beforehand, and hence, to have a method of protecting the disinfected, threaded needles permanently from rusting. Madelung suggests keeping them in alcohol. I have tried, among other fluids, glycerine and alcohol, and found both of them too hygroscopic for the purpose. The difficulties seem to be most readily met by the adoption of an antiseptic oil. I have used with satisfaction the oil of juniper berries. It is, furthermore, necessary to have a means of supporting the needles in the oil, and above the water with which the oil is, from the picking up of the needles with wet fingers or wet forceps, sooner or later, certain to become contaminated. It is not enough to place the needles on a wire-netting supported in the oil; for drops of water will surely be sustained at the points where the needles cross each other, and where they cross the wires, and at the points where the wires interlace.

Until we know of a better method of preserving the needles for immediate use, I would suggest the following one: Thread the needles with dry silk. Tie the silk with one knot in the eye of the needle. Bend to a little more than a half cylinder an oblong piece of very fine brass wire-netting on its long axis, and thrust the points of the threaded needles through the netting along the line of its greatest convexity. When a needle has been passed almost through the netting wind its thread about the half cylinder and tie the ends of the thread together near the eye of the needle. When all the needles have been introduced, and their threads wound and tied, place the wire-netting thus armed in

a cylindrical jar filled with the oil of juniper berries. Use the lowest needles first.

It certainly would be a great gain to the technique if such presection *half*-stitches could be devised, that one complete row of them on each side of the portion of intestine to be resected would suffice for the circular suture. I say *half*-stitches because, though the application of *complete* presection stitches (*vide* Fig. 7) is easy, it is rather annoying to

FIG. 7.



Plain-quilt, presection stitches introduced.

resect under them and to arrange them for tying (*vide* Experiments 11, 14, and 15, Group II.).

I have tried to perform circular suture of the intestine with presection *half*-stitches—one complete row of them on each side of the portion of intestine to be resected (*vide* Groups III. and IV.)—and, thus far, with unsatisfactory results.

### GROUP III. ONE COMPLETE ROW OF BURIED-KNOT, PRESECTION SUBMUCOSA SUTURES.

(For buried-knot stitches, *vide* Fig. 2, p. 452, and Fig. 5, p. 454.)

EXPERIMENT 1.—Small, black dog. Operation February 2, 1887. To make single circular suture with one complete row of presection, buried-knot stitches. The operation lasted three-quarters of an hour from the first cut into the abdominal wall until the application of the dressing. Irrigation with solution of corrosive sublimate of uncertain strength.

*February 3.* Dog evidently not feeling well.

*5th.* Found dead. *Autopsy:* No signs of inflammation in the peritoneal cavity; not even at the site of the suture. Positive evidences of corrosive sublimate irritation (*vide* Experiment 2, Group II. *Autopsy*).

EXPERIMENT 2.—Small skye-terrier. Operation February 2, 1887. To make a single circular suture with one row of buried-knot, presection stitches. The operation for circular suture lasted thirty-five minutes. Irrigation with the same strong corrosive sublimate solution as in the preceding case.

*February 3.* Dog found dead. *Autopsy:* Subperitoneal vascular injection and hemorrhagic extravasations. Blood-tinged fluid in the peritoneal cavity, etc. The circular suture is firm; holds water injected with sufficient force to distend the intestine. Death from too strong an irrigation fluid.

EXPERIMENT 3.—Rather small skye-terrier. Operated February 3, 1887. Same suture as in foregoing cases. Operation performed in thirty-four minutes.

*February 8.* Dog is dying. Killed. *Autopsy:* Purulent peritonitis, starting from the circular suture.



EXPERIMENT 4.—Small fox-terrier. Operation February 4, 1887. Same suture as in foregoing experiments of this group. Irrigation with solution of corrosive sublimate, 1:10,000.

February 8. Dog is dying. Killed. *Autopsy*: Purulent peritonitis, starting from line of circular suture.

EXPERIMENT 5.—Medium-sized, fox-terrier bitch. Operation February 7, 1887. Same suture as in foregoing experiments of this group. Irrigation with ordinary cold water.

February 21. Dog is failing. Killed. *Autopsy*: Intestines badly matted together by adhesions. Circumscribed abscess cavity surrounding, almost completely, the circular suture, which latter appeared to be firmly healed.

EXPERIMENT 6.—Medium-sized, jet-black bitch. Operation January 27, 1887. To reverse a portion of the intestine. Double circular suture. Presection buried-knot stitches. Operation lasted one and three-quarters hours.

January 29. Dog died. *Autopsy*: Purulent peritonitis.

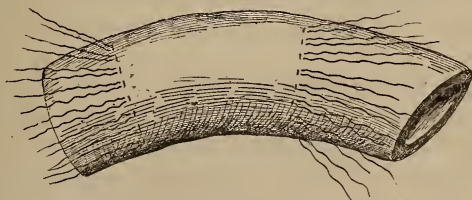
EXPERIMENT 7.—Medium-sized dog. Operation February 4, 1887. To reverse portion of intestine. Operation the same as in Example 6.

February 9. A.M., suddenly taken sick. P.M., died. *Autopsy*: Peritonitis. Abdomen distended with sero-purulent fluid.

#### GROUP IV. EMMERT'S STITCHES.

In the experiments of this group such presection stitches were applied as are represented in Fig. 8.

FIG. 8.



Emmert's stitches.

The idea of making such stitches I believed to be original with me, until I ascertained that I had been anticipated in the conception of them by Emmert,<sup>1</sup> who, however, had employed them only to sew up linear wounds of the intestine, and not for the circular suture.

EXPERIMENT 1.—Operation January 20, 1887. Single circular suture by one complete row of Emmert's stitches.

January 21. Dog, evidently, has peritonitis.

22d. Found dead. *Autopsy*: Suture had given away. Suppurative peritonitis.

EXPERIMENT 2.—Large, pointer dog. Operation February 9, 1887. The same suture as in Experiment 1.

February 11. Dog found dead. *Autopsy*: Purulent peritonitis starting from the circular suture.

EXPERIMENT 3.—Small, black-and-tan dog. Operation February 11, 1887. Single circular suture (Emmert's stitches) as in Experiments 1 and 2.

February 12. Dog died. *Autopsy*: Purulent peritonitis starting from the circular suture.

<sup>1</sup> Emmert: Pitha und Billroth's Handb. d. Chirurgie, Absch. vii. p. 209.

I shall not record the rest of my experiments on circular suture of the intestine, because most of them seem, now, rather absurd to me, and none of them admit of classification.

#### SUMMARY.

1. It is impossible to suture the serosa alone, as advised by authors.
2. It is impossible to suture unfailingly the serosa and muscularis alone, unless one is familiar with the resistance offered to the point of the needle by the coats of the intestine. Furthermore, stitches which include nothing but these two coats tear out easily, and are, therefore, not to be trusted.
3. Each stitch should include a bit of the submucosa. A thread of this coat is much stronger than a shred of the entire thickness of the serosa and muscularis. It is not difficult to familiarize one's self with the resistance furnished by the submucosa, and it is quite as easy to include a bit of this coat in each stitch as to suture the serosa and muscularis alone.
4. It is unnecessary in performing circular suture of the intestine to make more than one complete row of stitches if they be of the plain-quilt variety. Unless all of the stitches of the row are applied before a single one is tied, it is impossible to preserve a straight line in the application of them.
5. It facilitates the operation very much to make five or six presection sutures; for the eversion of the mucous membrane, which otherwise takes place and makes the application of first-row, postsection stitches troublesome, is thus prevented. The first presection stitches should be introduced at the mesenteric border of the intestine, and at a place as free from fat as possible.
6. The plain-quilt stitches are to be preferred to the ordinary Lembert's stitches (Knopfnähte) because, 1, one row of them (the former) is sufficient for the circular suture; 2, the knots of the first row of Lembert's stitches prevent the most accurate apposition of the opposed peritoneal surfaces; 3, the plain-quilt stitches constrict the tissues less than the Lembert's stitches; and, 4, the former tear out less easily than the latter. Madelung's cartilage-plates, which he employs partly to prevent the tearing out of the stitches, are unnecessary when a bit of the submucosa is taken up with each stitch.
7. The vessels of the excised intestine should be ligated by circumvection ("Umstechung"). It is not necessary to exsect a triangular piece of mesentery; and it is unadvisable to sew together the edges of the rent in the mesentery, for, in so doing, one might include small vessels which contribute to the blood-supply of the sutured parts.
8. Solutions of corrosive sublimate stronger than 1:20,000 should

not be used for irrigation. It would be better, perhaps, to employ weaker solutions (1:30,000 or 1:40,000). The irrigation should be attended to most diligently when the stitches are being tied.

## PRIMARY MALIGNANT DEGENERATION OF THE KIDNEY IN INFANCY.<sup>1</sup>

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PRIMARY malignant degeneration of the kidney is most frequently met with at the two extremes of life, infancy and old age. It is to the study of it as it appears in the first period that attention is invited.

Although this is comparatively a rare affection, yet one hundred and forty-four cases have been collected, and without doubt a more diligent search and better facilities than are afforded by the libraries of this city would reveal many more. As the disease has quite a typical course and array of symptoms, it can best be described by the detailed history of a case.

CASE I.—Wm. P., three years old, was first seen by me July 6, 1886. He was, at that time, an extremely emaciated child with an anxious expression, not so much indicating pain, as it did the presence of some serious constitutional condition; it was, in short, a very decided cachexia. Beneath his thin pinched face and flat thorax a remarkably prominent abdomen at once attracted attention.

The parents gave the following history: The child had always enjoyed good health. In the early spring he seemed to tire easily, and was generally seen to sit quietly by and not take much part in the play of the other children. This continued until late in April, when he had frequent and persistent turns of vomiting, which continued for a week or more, and resisted all the efforts to allay them. Early in May a hard swelling was accidentally felt in the left side. About this time he began to lose flesh and appetite and to have restless nights, and since this time his condition had grown rapidly and steadily worse. His appetite was gone, his extremities were reduced to mere skin and bones, and the tumor in the abdomen was growing rapidly. This increase in size had not been accompanied by any symptoms except an occasional turn of diarrhoea or a recurrence of the vomiting.

The family history was good, except that the paternal grandfather

<sup>1</sup> Read before the Cincinnati Academy of Medicine, 1887.

I desire to express my acknowledgment to the following gentlemen for their valuable assistance, in furnishing notes of cases, etc., in the preparation of this paper, Profs. Franz König, S. W. Gross, Charles West, John Croft, Roswell Park, Mr. R. J. Godlee, Mr. H. P. Symonds, and Dr. A. Seibert. Also to Drs. Stewart, French, and Hendley for their assistance in the microscopical work, and to Prof. Forchheimer for the use of his valuable library.



had had a cancer successfully removed from his lip in Freiburg, a few months previously.

Physical examination revealed a smooth round tumor, occupying the left half of the abdomen, and giving an indistinct feeling of fluctuation. The subcutaneous abdominal veins were greatly enlarged, as were those of the right thigh. Dulness on percussion extended from the ribs to the crest of the ilium, and from the median line of the back to the umbilicus. The greatest measurement around the abdomen was twenty-four inches. The patient was put under the influence of an anæsthetic, when a loop of intestine, which seemed to be the colon, was discerned passing across the surface of the tumor from the left side above and without downward and inward toward the right half of the pelvis. Three or four deep punctures were made into the tumor with a large needle, through which several ounces of a thick fluid, of a dark red color, were aspirated. But it was not possible to reduce the size of the tumor by aspiration. This fluid did not coagulate, and the microscope revealed the presence in it of a large number of red and white corpuscles, large proliferating cells, and a few poorly defined crystals.

The diagnosis was now made of a malignant degeneration of the kidney, probably sarcomatous in nature. This was based upon the following grounds: The tumor had begun above and had not come up from the pelvis, consequently it was in some organ either in or behind the abdominal cavity. An echinococcus cyst was excluded by the results of the aspiration, as was also a congenital cyst of the peritoneum. A leucocythæmic spleen was excluded, as there was not a general enlargement of the lymphatic glands, only a few small ones could be detected in the axilla of the right side. There was no history of chronic malarial poisoning, nor of any long-continued suppuration, which might have produced on the one hand, an ague cake, and on the other an amyloid spleen. Malignant degeneration of the spleen in infancy is practically unknown, as is also that of the pancreas. But the fact that a loop of intestine was found fixed upon the anterior surface of the tumor indicated very clearly that it was a retroperitoneal growth, and, therefore, either from the retroperitoneal glands or kidney. As the glands do not, when enlarged, cause a uniform tumor with a smooth surface, the kidney was clearly indicated as the seat of the affection.

Pyonephrosis does not give rise to tumors of this size, especially in infancy, and the characteristic changes in the urine were absent. Tubercular degeneration of the kidney was excluded for much the same reason, and because no other symptoms of tuberculosis existed. The results of the aspiration excluded hydronephrosis, and also a fibrocystic degeneration of the kidney. Cystic degeneration of the kidney is not uncommon in utero, which condition is usually bilateral, but after this period it is seldom met with until middle life.

The diagnosis was therefore made of a malignant degeneration of the kidney with fatal prognosis. The child had no fever after the aspiration and no pain, except such as was due to the presence of the tumor. Three days later, however, the waist measure had increased to twenty-five inches.

Careful and repeated examinations of the urine revealed nothing abnormal, except that the quantity was small and the specific gravity correspondingly high.

July 22d the abdomen measured twenty-six inches in circumference.

On the 26th the breathing, which had always been shallow and rather rapid, was observed to be much accelerated and very difficult. The patient had been coughing a great deal during the night and the lungs were found to contain numerous coarse mucous râles, especially in the lower lobes. It is a question whether or not the metastatic growths, found upon the post-mortem table, in the pleural cavities could have caused this catarrh. At the time it was supposed to be due to œdema, as there was more or less pleural œdema present.

For some time he was propped up in his baby carriage with pillows, where he remained day and night except when occasionally placed in an easy chair. At all times, however, he retained the upright position on account of the dyspnœa, which became very distressing if he relinquished it for a moment. He drank milk with apparent relish, but took little or no solid food.

All this time he had had no fever, but on the 3d of August his temperature rose to 100° F., in the afternoon. This slight fever disappeared again in a few days. The œdema had grown so marked that his eyes were partially closed by it. His respirations, however, numbered only thirty-two to the minute and there were not so many râles in the lungs.

The orthopnœa and dyspnœa remained unchanged. The size of the tumor gradually increased until the abdomen measured twenty-nine inches in circumference. Large tortuous veins passed up over Poupart's ligaments and spread out over the abdominal wall. The eyes were almost closed by the puffy lids, and the legs were swollen and tense as high as the knees. Bandages had been worn upon the legs for some time to sustain the skin. The tumor gradually enlarged until it had passed beyond the median line. Its edge was distinct, although rounded off. The colon could often be seen distended with gas, forming a marked prominence across the tumor. Its position never changed, and when it was not distended it could always be felt as a prominent band passing over the front of the tumor. During the last weeks diarrhœa had been almost constant. His strength failed until he was scarcely able to lift a small cup of milk to his lips. His entire attention was concentrated upon securing a sufficient supply of air, as the upward pressure from the abdominal cavity had apparently left but little available lung space. His death, on September 8th, was easy and due to exhaustion.

The post-mortem examination was made, with the assistance of Dr. R. W. Stewart, three hours after death.

*Thorax.* Right lung: Free from adhesions, tissue normal at the base; resting upon the diaphragm and adherent to the visceral pleura were two kidney-shaped bodies about the size of pigeon's eggs, of brain-like consistency and a uniform brownish color upon section. Left lung: Free from adhesions. Contained a small, hard, yellowish nodule in the lower lobe, slightly emphysematous at margins. At the base of the lung there were growths similar to those on the right side, but adherent to the parietal layer of the pleura. Heart empty and normal.

*Abdomen.* Contained about three ounces of yellowish clear fluid. A tumor extending from one and a half inches below the xiphoid cartilage to the pubes appeared in the incision, and was crossed by the descending colon, the latter running diagonally in the direction from the left nipple to the right iliac fossa, in which fossa the sigmoid flexure rested, passing thence across the base of the tumor to the rectum. The meso-colon separated in both directions over the tumor and was adherent to it, but could be stripped off; the transverse meso-colon was also adherent in the upper

portion to a slight extent. Upon the right side the hand could be passed around the tumor to the vertebral column without encountering resistance; upon the left side a few soft adhesions existed between the surface of the tumor and the abdominal wall, but these were easily broken through, thus allowing the hand to pass from the left iliac fossa to the margin of the ribs, but not external to the mammary line, this obstruction being caused by the attachment of the reflected peritoneum upon the abdominal wall. When this reflection of the peritoneum had been incised the hand passed quite readily through a loose connective tissue around the tumor to the vertebral column.

Upon the left side of the tumor, in the line between the nipple and iliac spine, were two hemorrhagic spots about the size of a quarter of a dollar. Over the entire surface of the tumor, wherever the peritoneal covering was removed, were numerous openings through which a cheesy material exuded. The tumor was larger than the largest head, and had the appearance of an immense brain with the dura mater covering it. Numerous large bloodvessels ran in all directions over the surface.

The tumor was tightly adherent to the pancreas on its under surface, and also to the diaphragm at its lower posterior segment upon the left side. In separating this last adhesion the diaphragm was broken through, giving exit to some serous fluid from the pleural cavity.

The tumor was easily shelled out from its peritoneal covering, but in doing so, a cyst situated in the upper part was ruptured and discharged a heavy, thick, caseous material. This cyst was about the size of a large goose egg and had no connection with other parts of the tumor.

Where the renal artery entered the tumor a thick pedicle was divided. The large veins from the surface all came together here. The renal artery was not larger than that of the right side. The tumor was evidently a degenerated left kidney of which no trace could be found.

The left ureter entered the posterior inferior portion of the tumor.

The small intestine and stomach were normal.

The right kidney was slightly hyperæmic.

The spleen was free from adhesions, although it had been pushed high up in the vault of the diaphragm by the tumor.

The pancreas was closely adherent to the upper surface of the tumor.

The liver was hyperæmic. It had been pushed downward and toward the right side, but was not adherent to the tumor.

The tumor weighed 3065 grammes, about 7 pounds. On section it presented the appearance of an enormously expanded kidney. The cortical portion, about an inch and a half thick, was honeycombed with blind pouches extending into it from a large central cavity. Some of these pouches were large enough to allow the insertion of a finger, others were much smaller. All of these central cavities were filled by a semi-solid, exceedingly offensive mass containing a large proportion of blood.

Drs. James French and R. W. Stewart kindly made microscopical examinations of the tumor, and reported that it was a round-celled sarcoma, containing remnants of the kidney structure. The metastatic growths from the thorax were typical examples of the round-celled sarcoma.

Dr. Stewart reported an apparent alveolar structure, which was due to large tubes or vessels filled with round cells.

The case just described is in many respects a typical one. The age of the patient, which was three years, corresponds exactly with the average age as given in one hundred and thirty cases.



Of these, twenty per cent. were under a year, twenty four per cent. between one and two years, seventeen per cent. between two and three years, twenty-one per cent. between three and four years: sixty per cent. of the cases thus occurring in the first three years of life, and over eighty per cent. in the first four years.

As is usually the case, the beginning of the disease was very insidious, and no exact time can be given. This is partly due, no doubt, to the fact that the inaccessible position of the kidney shields it from observation. I am strongly inclined to the belief that these tumors are always congenital, and that their growth may either begin during the intra-uterine period, or that they may remain dormant until, from some cause or other, they are stimulated into active development. That they may grow even before the birth of the child is shown by the cases reported by Jacobi, Paul, and Osler, in seven and eight month fœtuses. One case is recorded as having been eight years in developing in an eight year old child. In quite a number of cases the rapid growth dates from a trauma, to which the degeneration has been attributed by some authors. In these cases the dormant heterogeneous tissue has probably been stimulated by the trauma into activity. This theory of their congenital origin is supported by the tender age of the vast majority of patients, and by the observations and deductions of Cohnheim and Grawitz. Cohnheim's explanation of the presence of striped muscular fibres in a small percentage of these cases is, that owing to the close relationship in position of the first rudiments of the uro-genital organs to the proto-vertebræ, by faulty segmentation of the latter some of the germinal muscle-cells may become incorporated with the cells constituting the first rudiments of the kidneys, and that these germinal muscle-cells afterward develop into the pathological new growth. Grawitz has observed small collections of the tissue of the renal capsule incorporated in the kidney. He accounts for its presence in the same way that Cohnheim accounts for the muscular fibres—*i. e.*, by a fault in the development. These small islands of tissue may remain in their abnormal position for years and apparently never develop, or after an indefinite period they may begin to grow, giving rise to cancerous tumors. Grawitz found small collections of cells resembling the tissue of the suprarenal capsule in the kidneys of adults where they had apparently remained dormant during the entire life of the individual, giving rise to no symptoms and no local disturbance. The duration of these cases, dating from the first symptoms, whether that be a tumor, hæmaturia, persistent vomiting or pain, is misleading, for, as stated above, they are all probably of congenital origin. The average duration of the sixty-two cases in which it is mentioned, is seven and a quarter months. The shortest time is six days and the longest eight years. Of the symptoms mentioned the tumor is more apt to be the first observed than any of the others. Seibert, who analyzed fifty cases in

his excellent article on hæmaturia in this disease, found that in thirty-six of these the tumor was the first symptom.

In the case just described the patient was a male, and the tumor was on the left side, while in the next case the patient, a female, had the tumor on the right side. These two cases are typical ones in regard to sex and position of the tumor, as in all the cases neither sex has any advantage over the other in immunity from the disease, nor can it be said that it is more likely to be found on one side of the body than the other.

Hæmaturia occurs in about fifty per cent. of all cases, but in a great many of these it comes on late in the course of the disease or after the tumor has been discovered. It is a symptom of the greatest importance in that small percentage of cases in which it is the first danger signal and by means of which an early diagnosis may sometimes be made. It was present in fifty per cent. of the cases in which the presence or absence of the hæmaturia was referred to in the reports. In those under one year of age hæmaturia was present in thirty-seven and a half per cent., while in those between one and five years it was observed in fifty-six per cent. If we take the total number of cases under one year and suppose that hæmaturia was absent in all cases in which no record is found, then it was present in but thirteen per cent. of the cases, while in those between two and five years, computed in the same manner, it was present in forty-four per cent. In either case the increase is very marked between the first year of life and the succeeding ones. In neither of the cases reported in this paper was it present at any time. Hæmaturia depending upon this condition is usually profuse in quantity. Rohrer describes three varieties of hæmaturia from cancerous kidneys, but his description is based, for the most part, upon observations of adults. The hemorrhage is either acute, accompanied by grave general symptoms if profuse in quantity, or is much less in quantity and takes place without causing any symptoms, or, lastly, the amount of blood lost is so small that it can only be detected by the microscope. It may recur frequently or may be observed but a few times in the entire course of the disease. Seibert reports a case in which it was the cause of death. In this case the hemorrhages had been excessive in quantity and very numerous. Seibert's classification of hæmaturia and its significance is as follows:

I. Hæmaturia occurring in apparently healthy children.

a. Without pain previous to the occurrence.

b. Preceded by pain.

The hæmaturia of nephrolithiasis must be excluded by chemical and microscopical examination and by the amount of hemorrhage. A very important factor is that this latter hemorrhage is always preceded and accompanied by pain, while if dependent upon malignant degeneration

the pain always ceases when the flow begins. That is supposed to be due to the fact that the blood retained in the pelvis by a coagulum in the ureter causes pressure-pain, which is relieved when the pressure becomes great enough to force the blood past the obstruction.

Hemorrhage from a tubercular kidney must also be excluded, but this is seldom present in children, and very rarely unless general tuberculosis exists.

II. Hæmaturia occurring in children in poor health without any apparent cause for the general condition.

This variety is rare because the tumor can usually be felt before it has existed long enough to make any marked inroad upon the child's health.

III. Hæmaturia occurring in children during or soon after an attack of any of the acute infectious diseases.

This variety may occur as the result of an acute inflammation in a healthy organ, but is then neither so profuse nor of as long duration as that from an organ which is the seat of malignant degeneration.

IV. Hæmaturia occurring in the course of chronic inflammation of the kidneys.

If the hemorrhage takes place without any symptom of an acute exacerbation of the chronic inflammation, cancer must be thought of, if renal calculus can be excluded.

Upon the post-mortem table metastatic deposits were found in the lung, and also attached to the pleura in the case just reported. Primary malignant growths in the kidney, as has been known for a long time, have little tendency to produce secondary deposits in other organs. They frequently attain great size, but are prone to remain within the strong capsule in which their development first began. This is as true of these tumors in infants as in adults, and truly marvellous examples of this peculiarity can be seen in the three largest tumors on record, two of which weighed thirty-one pounds each and one twenty-seven and a quarter pounds, and yet no secondary deposits were present in any of them. In fifty per cent. of the cases collected, in which death was due to the disease, no metastatic deposits were present. This is a fact worthy of the most careful consideration and which will be referred to again in discussing the permissibility of the removal of these tumors by operative measures. In the cases in which secondary deposits were found their seat was most frequently in the lungs or the liver, and with the next greatest frequency in the retroperitoneal and mesenteric glands.

These tumors show comparatively little tendency to produce secondary growths and even a more marked immunity from adhesions to the organs of the abdominal cavity. This is probably due to the fact that the tumor without regard to its size or the degenerations which it has undergone, remains within its capsule behind the peritoneum. As the



capsule is thick there is little direct irritation of the peritoneum covering it, and hence, not that very decided tendency to the production of adhesive inflammation which characterizes malignant tumors within the peritoneal cavity. The tumor is also usually very easily removed from within its capsule, as is noted in very many of the post-mortem records and as was found in both of the cases reported in this article.

The presence or absence of adhesions is found recorded in fifty-five cases. In fourteen of these the adhesions were to the colon only. As the tumor grows from directly behind the colon the mesocolon very soon becomes part of its covering, as the size of the tumor increases, and the colon is bound down and becomes adherent, by means of its mesocolon, to the surface of the tumor. This is, however, very readily loosened by an incision external to the colon and a little dissection with the end of the finger. Among these cases are the two largest on record, in which the tumors weighed thirty-one pounds each, and one of which had existed for eight years. In one of Abercrombie's cases, in which the existence of the tumor was known for three years, there were no adhesions whatsoever. In ten cases there were no adhesions and in four the record is that they were very slight. These three classes give a total of twenty-eight cases or fifty per cent. of all those in which this condition is noted. Of the cases in which adhesions were described we find them to the liver twelve times, to the colon eleven times, to the pancreas and small intestine each six times, to the stomach and duodenum each three times, to the diaphragm, vena cava, and omentum, each twice, and to the sigmoid flexure, cæcum, opposite kidney, vertebral column, renal glands, mesentery, spleen, aorta, portal vein, ligament hepato-renal, and the ribs, in one case each.

The dimensions to which these tumors occasionally attain is marvellous when we consider the diminutive size of many of the patients, some of whom were not much larger than their tumors. The largest tumors of this class have been referred to above, weighing thirty-one pounds each; one in an infant of ten months weighed ten pounds. The smallest weighed but little more than the normal organ, and between the two extremes all gradations are present. The average of the seventy cases in which the weight is given, is about seven pounds. The sarcomatous kidney of infancy is, on the average, larger than that of adult life. The entire kidney is sometimes degenerated and nothing of its normal structure remains to identify it. In other cases the growth would seem to have started in the pelvis of the kidney, or in the glands found near the hilus, as in these cases the kidney tissue can be discovered lying on the surface of the tumor, which has apparently pressed it in front or to one side of it as it grew. The boy's case belongs to the first class, while the case about to be reported is a typical example of the second. In this case the kidney formed a slight prominence upon one

side of the solid round tumor. The tumors frequently have cysts in the interior, usually containing blood and broken-down tissue, although occasionally a clear, viscid, tenacious fluid is found.

The presence of these hemorrhagic cysts explains why the diagnosis of fungus hæmatodes and encephaloid is so frequently found, especially in cases reported years ago, when macroscopical diagnoses were more frequent than they are now, since the more exact anatomical pathological classification of to-day requires that a careful microscopical examination shall sustain the clinical and macroscopical diagnosis. For the same reason cancer and carcinoma are found in the older reports in a majority of the cases, while in the more recent ones some of the sarcoma group take their place. Smith, in his article on primary sarcoma of the kidney in *The American Journal of the Medical Sciences* for 1886, says, that, although scirrhus is often spoken of, it is rare as a renal growth. If this is true in general, it must be particularly so in the case of infants, for carcinoma is rare in infancy and childhood, and the kidney forms no exception to this rule. Let us examine the cases to see if this conclusion is supported by them; remembering that some of them date as far back as the fourth decade of this century, about the time that attention was first called to the occurrence of primary malignant degeneration of the kidney. We find a diagnosis given in 120 cases. In 23 of these the diagnosis is sarcoma, in 15 rhabdomyoma, in 14 round-celled sarcoma, in 5 spindle-celled sarcoma, in 5 medullary sarcoma, in 4 adeno sarcoma, in 3 a combination of spindle- and round-celled sarcoma, in 2 myxo-sarcoma, and in 1 sarcoma-carcinomatous; giving a total in the sarcoma group of 76 cases, or 61 per cent. of all. In the carcinoma group there are, 4 carcinoma, 10 medullary carcinoma, and 1 carcinoma hæmatodes; a total of 15 cases, not quite 13 per cent. of all. In a third group of cases in which the diagnosis may be regarded as indefinite, there are 17 cases designated as encephaloid, 15 malignant and cancerous, and 3 fungus hæmatodes; a total of 35 cases. Some of these cases might be referred to the sarcomata and some to carcinomata, but that is impossible unless they could be reëxamined by a reliable pathologist, as was done by Eve, who examined a so-called medullary tumor from the kidney of an infant, which had been deposited in the museum of the Royal College of Surgeons, London, in Hunter's time, and discovered that it belonged to that rare group of tumors which have been variously designated as rhabdomyosarcoma or as myosarcoma striocellulare. More than half of these cases are, therefore, sarcomatous in character, and but an eighth of them carcinomatous. But a large proportion of these cases have been diagnosed upon evidently insufficient evidence as to their true nature and even before pathologists had actually defined the characteristics of the malignant growths as they are understood to-day. In latter years the carcinomatous kidneys of infants have been seldom re-

ported, and the proportionate number of sarcomatous tumors has greatly increased. But carcinoma does occur, and one case in point was reported by Dr. Rowe, of Cincinnati, in which the diagnosis was made by two accurate and reliable pathologists, Drs. Kebler and Mackenzie.

Twenty per cent. of the sarcomatous tumors have been found upon careful examination to contain a tissue entirely foreign to the kidney, namely, striped muscular fibres. As these tumors are for the most part spindle- and round-celled sarcomata containing striped muscular fibres and oftentimes inorganic muscular tissue, it is probable that a careful search would result in increasing the number of the rhabdomyosarcomata. The presence of the unstriped muscular tissue is not difficult to account for, as it normally exists in the kidney, and has been seen there by both Henle and Eberth, but it remained for Jardelet, of Vichy, to describe its distribution. He found a system of muscular fibres springing from the pelvis and running parallel to the larger arteries and veins in the perivascular areolo-fibrous sheath of the vessels, but never constituting a complete sheath to any vessel and not extending far amongst the renal tubuli. This muscular tissue becomes hypertrophied in lithiasis, hydro-nephrosis, and all chronic inflammations. But while the inorganic muscular tissue is thus physiologically present, the striped muscular fibres are entirely heterogeneous. The most generally accepted explanation of its presence is Cohnheim's, which was given above. Paul describes an apparent development of striated fibres from the sarcomatous elements themselves, in the case of a seven months' fœtus examined by him. Birch-Hirschfeld speaks of the same thing. Such a development of spindle cells agrees with the observations of Zenker upon the regeneration of muscle in wounds, who described it as taking place from the spindle cells of the interstitial connective tissue. Waldeyer agrees with Zenker upon this point.

CASE II. was under the care of Dr. R. W. Stewart. The child, a little girl of German parentage, one year and eight months old, was large and well developed for her age. She had always seemed well and was unusually active. The marked prominence of the abdomen first attracted the mother's attention in April, 1886, and caused her to seek medical advice. Dr. Stewart saw her first early in July. A few days later a thorough examination of the case was made under an anæsthetic. The tumor was found on the right side and was firmly fixed in its position in the lumbar region. The fingers could be inserted between the upper edge of the tumor and the liver, and also between its lower border and the crest of the ileum. The tumor was of a regular ovoid shape with a smooth surface. The dulness was continuous upon both gentle and deep percussion from the tumor around to the median line of the back. Several punctures with the needle of the aspirator secured but a few drops of a thick, gelatinous, colorless fluid. There was, however, no sensation of deep fluctuation upon palpation. A fold of intestine, which was at the time regarded as the colon, was situated between the



tumor and the anterior abdominal wall. The diagnosis was a degeneration of the kidney, and the prognosis, therefore, necessarily fatal unless the tumor could be removed, to which the parents would not consent. Hæmaturia was not present at any time. An examination of the urine showed it to be acid, of a specific gravity of 1.020, and containing neither albumen nor sugar.

The growth of the tumor was very rapid, and in three months time it had increased so greatly that it began to interfere materially with respiration and sleep. The parents now saw that the child's condition was serious and wanted an operation performed. At this time the groove between the liver and tumor had about disappeared; it had encroached upon the abdomen as far as the median line and extended down to the crest of the ileum. Every other organ in the body seemed to be perfectly healthy, and the tumor was simply beginning to interfere mechanically with the digestive and respiratory systems. Therefore, as a last resort, it was decided to operate, although the opinion of all who examined the case was that the chances had become decidedly against the child, and that three valuable months had been lost in waiting. Every preparation was made that could in any way have a favorable influence on the result.

On the afternoon of October 9th I removed the tumor through the anterior abdominal wall, being assisted in the operation by Drs. Stewart, Ransohoff, Christopher, Wilder, and Hendley. Langenbeck's incision was made because the tumor was too large and solid to have been extracted through any lumbar incision and because the abdominal incision was regarded as the safer, allowing, as it would, a thorough exploration of the relations of the tumor, and showing at once the existence of any dangerous or extensive adhesions. The incision was made of moderate length, but was immediately lengthened from the margin of the ribs almost to the crest of the ilium. The tumor presented, crossed from below upward by the ascending colon. No adhesions existed, and so the peritoneal covering of the tumor was incised and torn through external to the large intestine. As rapidly as possible the peritoneal covering, together with the mesocolon and colon, was dissected loose with the finger from the tumor. Although not very difficult to accomplish, it was rather a tedious dissection. Upon the lower segment of the tumor several large veins were ligated and divided in order to extend the incision in the peritoneum. Then the lateral attachment to the peritoneum and the loose ones, behind the line of reflection of the peritoneum from the tumor to the abdominal wall, and between this line and the vertebral column, were torn and dissected loose. The pedicle could now be readily reached. The tumor was drawn out through the incision, the pedicle clamped, ligated, and cut off.

There was no oozing whatsoever from the large surface from which the tumor had been removed, and, after cutting off the ligatures and dropping the pedicle, the abdominal wound was closed, the bandages applied, the child put to bed and surrounded with hot bottles. The operation had lasted an hour and a half, and the child had taken the anæsthetic very badly. Several times the ether had to be withdrawn as the respirations became bad or as the pulse grew weak, and twice it was necessary to give small hypodermatic injections of whiskey to stimulate the flagging heart. She vomited repeatedly after being returned to bed and became entirely conscious. The heart was, however, weak and

rapid, and would not respond to any stimulant. Two hours after the end of the operation the patient died of shock.

No post-mortem examination was obtained. The tumor was round, with a slight oval prominence on one side. Upon section it was of a uniform grayish white color, except the oval prominence on the side, which was evidently kidney tissue. Just between this kidney and the tumor proper were a few cysts the size of marbles. It was from one of these that the fluid obtained in the exploratory puncture had been drawn. The tumor weighed 830 grammes, about 2 pounds.

Drs. Stewart and Hendley made microscopical examinations of the tumor, and found that it was a spindle-celled sarcoma with bundles of connective tissue passing through it. The kidney itself was also sarcomatous, only an occasional glomerulus could be found, and the tubules were almost entirely obliterated.

Eminent authorities, both in America and Europe, have expressed the opinion that it is unjustifiable to remove degenerated kidneys in infants, but these same authorities for the most part advise the removal of sarcomatous kidneys in adults, their conclusion being based upon the statistics of the operation. A critical examination of the cases of this operation is, therefore, in place in order to determine whether or not their verdict should be final. In the first place we must remember that this is a comparatively young operation, so young that Rohrer's book, published but a decade ago and otherwise very complete, does not even allude to the possibility of operative interference. Also that but twenty-five cases have been operated upon, and many of these, as will be shown shortly, were undertaken long after the time for successful interference had passed.

It is only after the indications for an operation have been settled that the statistical study of it becomes valuable, and that it may be condemned or admitted to the ranks of justifiable operations upon its record as established on a scientific basis. Let us glance for a moment over some of the cases which have brought the operation into discredit. In one case death occurred upon the table from hemorrhage. It was an unpremeditated nephrectomy, as the diagnosis of a kidney tumor had not been made. The tumor was very large, weighing five pounds, and had encroached upon the walls of the vena cava, hence the unfortunate accident. Moreover, the tumor had existed for a year. In another case, of which the exact account was not accessible, the tumor weighed four kilogrammes, about ten pounds; comment is unnecessary. We find in the record of another case that the tumor was very large and its entire removal proved impossible, and in another that death followed the removal of a very large tumor. The youngest patient, eleven months old, died after the removal of a tumor designated as very large although the exact weight is not given. One operator unfortunately included the vena cava in the ligated pedicle, and another one lost his little patient, who

had been doing very well, by the accidental strangulation of a loop of intestine in the posterior opening in the peritoneum. These seven cases may justly be excluded from the consideration as due to accidents, or to be regarded as operations undertaken simply as the last resort; the operators and friends of the little patients having accepted the desperate chances of an almost necessarily fatal operation, as being preferable to certain death of a lingering and exceedingly painful character.

We would then have eighteen cases remaining. As the records of several of these have not been accessible it is not possible to analyze them more closely. Of these eighteen cases, we find that eight died from the immediate results of the operation, either from shock or septic complications, and that ten recovered. Of the ten that recovered six died of a recurrence of the disease in periods extending from five to eighteen months after the operation. Four were doing well when last heard from. One of these, however, is König's little patient, and as the operator saw degenerated mesenteric and retro-peritoneal glands, he consequently thinks that the child died of a recurrence, although he has not heard of its having done so.

From these eighteen cases we have fifty-five per cent. of immediate recoveries, but if the whole number of cases be taken this is reduced to forty per cent. Of those that recovered six subsequently died from a recurrence. The permanency of the cure is not established for all of the remaining cases, as not a sufficient number of years have elapsed to exclude the possibility of a return of the growth.

For a condition as desperate as this, nephrectomy certainly seems to be a beneficent measure and to offer the only avenue of escape to the victims of this malady from certain destruction. Can any arguments for or against the operation be drawn from the study of cases which have gone on to their fatal termination? Let us glance back and see.

The age of a majority of the cases certainly increases the danger of the operation. But infants undergo many major operations, and while there is greater liability to fatal shock than in adults, yet as the records of nephrectomy and other operations show, many pass this danger point in safety. One of the most remarkable cases, in this connection, was that of Dr. Park, which demonstrates very conclusively that even the removal of large tumors from very young children is not necessarily fatal. In this case a large fibrocystic tumor of the right kidney weighing four pounds was removed from a boy twenty-three months old. He was in excellent health a year after the operation. Godlee's case was still younger, but the tumor was not so large. Both children recovered with scarcely an unfavorable symptom.

Park's case is also a very interesting one in this connection, as its clinical history so nearly resembles that of a malignant tumor, in the



rapidity of its growth, its influence upon the general health, etc., that it might be almost impossible to make a differential diagnosis in a similar case; and if the diagnosis of a malignant growth should be made the patient might be allowed to die without an effort to save him, although the victim of a benign tumor, only malignant in its encroachment upon the functions of other organs. This little patient, to-day enjoying life and health, is the most eloquent argument for this operation, as but a slight mistake in such a case would result in the loss of a life that might have been saved. Who is so infallible that he is never mistaken in a diagnosis.

The presence of metastatic deposits in other organs would, of course, render any operative interference futile. But it has been shown that they are not very liable to be present, fifty per cent. of the cases remaining free from them even after the disease has run its course.

The remarkable immunity of even large tumors, of this class, from adhesions to the abdominal viscera renders their removal more rapid and less dangerous than it would be if adhesions were the rule.

The fact that in about one-tenth of all cases both kidneys have been found affected, increases the dangers of the operation and decreases the chances of a permanent cure. A careful examination of both kidneys should, therefore, precede every operation. In this way the presence of a second tumor might be discovered and the operation abandoned.

After a careful consideration of this question I must say that I am decidedly in favor of the operation, and think that if made when the tumor is still small, its results in the percentage of permanent recoveries will compare very favorably with those of malignant degeneration of other organs.

The abdominal incision was made in all but three cases. This was more from necessity than choice. In one case the lumbar incision had to be lengthened so far forward that the peritoneal cavity was opened in order to gain space. The lateral abdominal, or Langenbeck's incision, allows the posterior opening in the peritoneum to be made external to the colon more readily than the median abdominal incision. König's incision is an oblique one from above and external downward and inward diagonally across the tumor. This incision would probably give more room and permit the operator to ligate the pedicle with more ease than either of the others. Having opened the abdomen and explored the tumor to determine the extent of the adhesions if any, and, if possible, the opposite kidney to exclude a possible degeneration of it also, the next step is to open the posterior parietal layer of the peritoneum over the tumor. This should be done external to the colon and parallel to it in order to avoid the celiac arteries. The tumor can then be readily dissected out from the retroperitoneal tissue, as has been shown not only

in the operations but also in the post-mortem examinations of cases that have died of the disease.

As in all nephrectomies, the question of ligating the ureter or of simply allowing it to take care of itself, is still sub judice. The ligatures on the pedicle should be cut off short and the pedicle returned to its normal situation. The incision in the posterior layer of the peritoneum might be carefully closed with sutures in order to leave the cavity, from which the tumor has been removed, behind the peritoneum, and cut off any subsequent suppuration here from the peritoneal cavity by drainage through a counter-opening in the lumbar region. This procedure would be particularly indicated when the dissection has been difficult and suppuration was to be feared. This practice has been followed after the removal of large retroperitoneal tumors with very gratifying success.

The operation, the statistics of which I have given, has so far succeeded in lengthening the lives of ten children, and of saving some of them. There is every reason to hope that in the future early diagnosis and early operations will show a much larger percentage of cures. As in all other malignant tumors, an early removal is necessary to success, but even late operations may lengthen life and possibly save it. König says, operate whenever it is possible. That is, make explorative incisions, and if extensive adhesions or visible metastatic growths forbid further interference, desist from the operation.

Let the teachings of more extended experience be our guide, and until its light burns more clearly let us not condemn these little unfortunates without making at least an effort to save them.

NOTE.—The twenty-five operations referred to were made by the following operators. König, three cases; Czerny, Rawdon, Godlee, Longstreet Taylor, Dandois, Jessop, Bardenheuer, Pughe, Kocher, Croft, Hueter, Meredith, Scheven and Mitzel, Ollier, Bantock, Reezey, Hicquet, Schoenborn, Little, Barker, Bokai, Jr., and Heath, each one case. The ten cases that recovered were the three cases of König, and the cases of Godlee, Dandois, Jessop, Bardenheuer, Croft, Hicquet, and Schoenborn. Of these, two cases of König, and the cases of Dandois and Schoenborn were doing well when last heard from.

Park's case is not included, because it was not a malignant degeneration of the kidney. It was doing well a year after the operation.

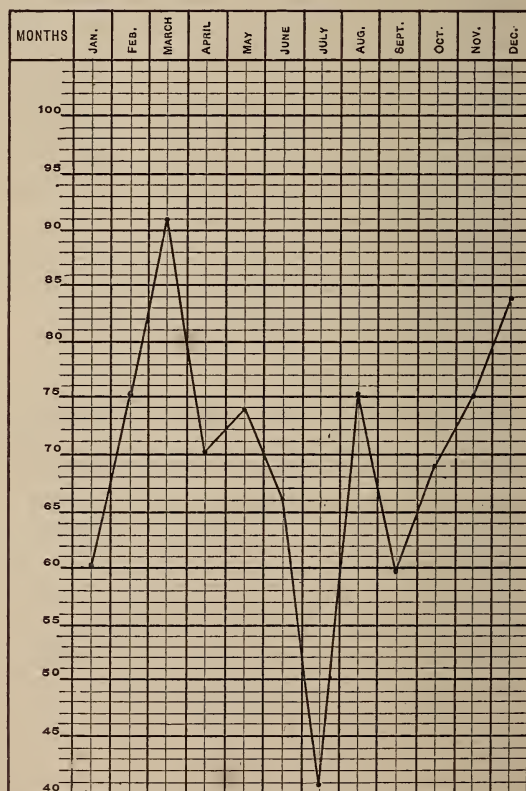
# A CONSIDERATION OF THE RESULTS IN 327 CASES OF TRACHEOTOMY,

PERFORMED AT THE BOSTON CITY HOSPITAL FROM 1864 TO 1887.

BY ROBERT W. LOVETT, M.D., AND JOHN C. MUNRO, M.D.,  
FORMERLY HOUSE SURGEONS AT THE HOSPITAL.

(Concluded from page 170.)

WE herewith present the tables referred to in our article which appeared in the July number of this journal, and which were accidentally omitted from the text.



*TABLE I. Curve of monthly percent of deaths after tracheotomy at the Boston City Hospital. 1881-85 inclusive.*



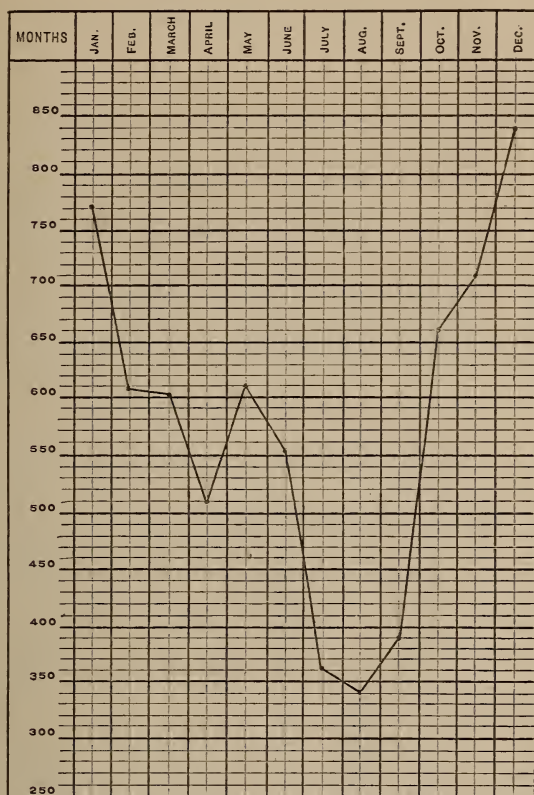


TABLE II. Curve of actual number of cases of diphtheria in Boston, by the month for 1881-85 inclusive.

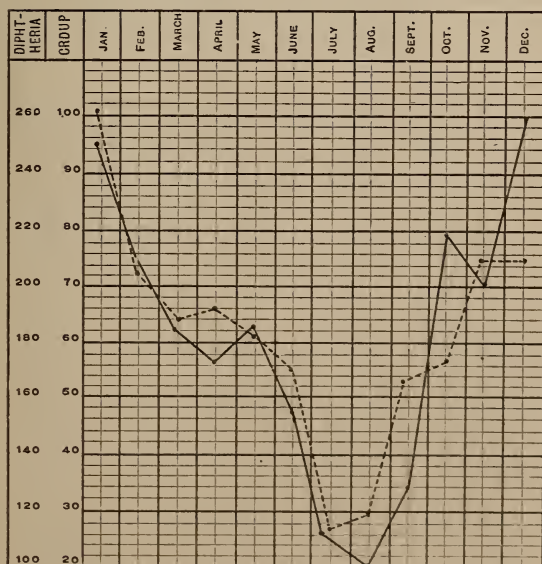


TABLE III. Curve of number of deaths by the month from Diphtheria and from Croup. 1881-85. inclusive.  
Diphtheria ————— Croup - - - - -

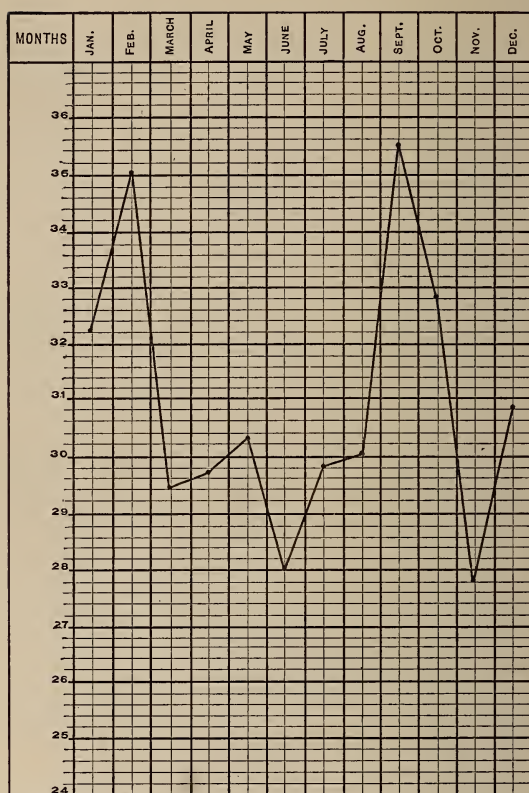


TABLE IV. *Curve of mortality percent of diphtheria. 1881-85 incl. Proportion of fatal cases to cases reported.*

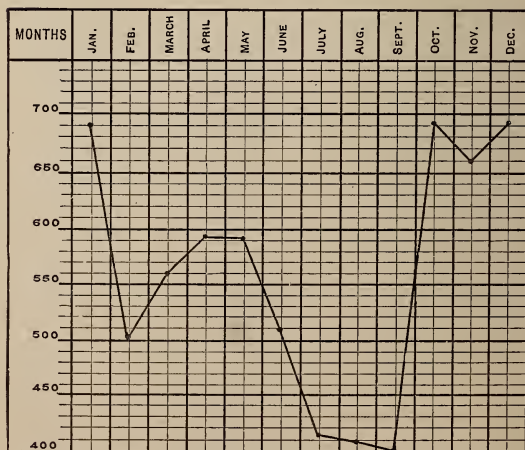


TABLE V. *Curve of prevalence of scarlet fever by the month. 1881-85 inclusive Number of cases reported.*

## REVIEWS.

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AUTOBIOGRAPHY OF SAMUEL D. GROSS, M.D., D.C.L. Oxon, LL.D. Cantab., Edin., Jeff. Coll., Univ. of Pa., Emeritus Professor of Surgery in the Jefferson Medical College of Philadelphia. With Sketches of his Contemporaries. Edited by his Sons. 2 vols. 8vo., pp. xxxii. 407, 438. Philadelphia: George Barrie, 1887.

WHEN it became known, soon after the death of Professor Gross, that he had left in manuscript for publication an extended autobiography, partly in the form of a diary, which he had kept for many years of his busy and varied professional life, a laudable curiosity, and, in some quarters possibly, an earnest anxiety was awakened to see its contents, to look behind that veil of conventionalism by which we are all more or less concealed from view, and from this nearer standpoint to become acquainted with the nature of the man himself, and discover, if possible, the sources of his remarkable influence and power.

His long-tried friends, who followed with him for more than a third of a century, and are now wearing the invisible crape of sorrow for the loss of his personal presence, will here find the reasons for the faith which was in them clearly transcribed, and can point with commendable pride to indisputable proofs, if such were needed, of the manliness of his character, the truthfulness of his nature, his generous and forgiving spirit, and the unsullied virtue of his noble life. In this frank disclosure of the thoughts of his heart, they will recognize a remarkable correspondence with his walk and conversation, and be convinced that the plane upon which he moved was of even greater elevation than they had supposed. Those who were once his enemies—and of these it is deserving of mention, that he had more than sufficient in number to exempt him from the Scriptural denunciation of those of whom all the world speak well—who in the earlier stage of his career scoffed at him from the roadside, but who, apparently, led by the desire for loaves and fishes, subsequently joined the company of his true disciples, and thereafter were accustomed to greet him with a widely heard “Hail, Master,” when they met him in public places, will be also greatly gratified to learn from the record, that, not doubting the sincerity of their conversion, he admitted some of them to a high place in his regard. Those who persistently continued in their jealous opposition, and openly resisted his advance to professional premiership, if any such remain, will be sorely disappointed in their search here for even so much as mention of their names.

To make a satisfactory analysis of these two well-filled and admirably printed volumes would require the construction of an independent biography, a work of love such as has been already given in this journal shortly after the death of the illustrious author, and in the preliminary sketch prepared for the work by his affectionate friend, the late Professor



Austin Flint, Sr., M.D. Brief notices arranged somewhat in the form of a narrative of some of the more prominent features of the work is all that will be attempted here.

It has been said that some men are born to greatness and others have greatness thrust upon them. To neither of these classes did Dr. Gross belong. He was, not in its common acceptation, but in the truest sense of the phrase, a self-made man; not made by his surroundings, not forced by early poverty, privation, neglect, and the pressure of insurmountable difficulties upon the right hand, and upon the left to pursue an unselected pathway leading to an unknown country. He was directed to it by his own deliberate choice, when other and apparently easier routes presented themselves, and followed it assiduously with his eyes fixed upon the heights which ever beckoned him upward. The story is a fascinating one from the beginning to the end, and will of itself greatly interest the reader, without considering the many diversions by the way; but it can be learned only from the book itself. The road which was somewhat broken and circuitous, and in places rugged and precipitous, is here clearly delineated. In imagination one can almost count the steps as they are successively surmounted, while the exertion of the toiler is in a measure lost sight of in the interest and pleasure with which we contemplate the steady tread by which he gradually but surely and with encouraging voice passes all who started with him, many of them as zealous as he to attain the elevation upon which his feet alone were destined to rest.

He tells us that he was born upon the 8th of July, 1805, of Christian parents, in the possession of a fair allowance of this world's goods, and that, notwithstanding the pleasures and distractions of boyhood, he early determined upon a course of life from which he never afterward seriously swerved. This was the more remarkable, considering that he lost his excellent father when only seven years old, and his education was mainly under the control of his guardians.

Riding, fishing, shooting, swimming, snaring rabbits, and pitching pennies, to the last of which he subsequently ascribed much of his combined accuracy of eye and precision of hand, were the principal amusements of his leisure hours—of which he seems to have had not a few, despite the earnestness with which he applied himself to his studies. And here we see, even at this early age, an exhibition of a great gift, the power of combining without interference work and relaxation, which was such a striking picture of his after-life. In this he resembled von Humboldt, Sir James Simpson, Sir Humphrey Davy, and a few other fortunately constituted students, who, in addition to the performance of an enormous amount of intellectual and practical labor, found an abundance of time, not only for the exacting demands of the fashionable, polite society in which they moved, but also for indulgence in much unprofessional reading, and many innocent amusements. But, notwithstanding his frolicsome nature, and the zest with which he engaged in all the diversions of a boyhood spent in the country, he was never guilty, as he solemnly assures us later in his memoirs, of insobriety, gambling, or any other form of immorality.

At the age of seventeen, thinking himself sufficiently instructed to undertake the study of medicine, he entered the office of a physician, in Easton, his native town, and was set to work at once, as was the abominable custom at that day, upon old and obsolete books on the practice

of medicine, surgery, obstetrics, anatomy, etc. He had the good sense soon to discover that this was not the proper course to pursue, and also that his previous education, especially in Latin and Greek, was not extensive enough to enable him to comprehend with readiness the technical terms which he encountered in his reading. The result of this discovery is thus stated:

"With some degree of hesitancy, lest I should give offence, I disclosed my feelings to my preceptor, and, much to his honor, he at once released me from any obligation to serve out my term of study. *This was the turning-point in my life.* I had pondered the matter with much care; it had worried and fretted me for days and nights; and, as I was naturally very diffident, it required all the courage I could summon to make known my wishes. The promptness with which they were seconded gave me such relief that I once more drew a long and comfortable breath. I had made a great discovery—a knowledge of my ignorance, and with it came a solemn determination to remedy it."

He therefore resumed his preliminary studies, first at the academy in Wilkesbarre, then at a private school in the City of New York, and subsequently at the high school at Lawrenceville, New Jersey. The two years thus spent were devoted mainly to the acquirement of the Greek and Latin languages, to which were added mathematics and geography, and a large amount of miscellaneous reading. His piquant sketches of his teachers, and the relation of some of the incidents of his school-life, especially his visit to Trenton, New Jersey, to witness the arrival of General Lafayette, who was then (1824) on a tour through this country, make very pleasant reading; but what appears to us most remarkable is, that a lad of seventeen should possess the wisdom, and exercise the resolution, to suspend his professional studies in order to supply what he considered the deficiencies of his preliminary education, especially when it is remembered that he was quite the equal, probably much in advance, of any of his companions in the extent and accuracy of his scholastic acquirements. It is most fortunate, however, that this discovery was made at such an early day, as it is usually only in after-life that the eyes of most men thus circumstanced are opened, when it is too late to correct the error.

That the classical training which he experienced during these two years was of incalculable service to him no one who is familiar with his writings can doubt; and yet it is due to the truth of his history to tell, what is not mentioned in his diary, that when, in 1845, a pupil in his office became the subject of similar convictions, and consulted him as to the propriety of resorting to Transylvania University, a noted classical institution at Lexington, Ky., he advised against the scheme.<sup>1</sup> In fact, it would seem from an entry made July 18, 1883, that his early opinion as to the necessity and special advantage of the acquirement of the dead languages preliminary to the study of medicine, or any other profession save theology, underwent some modification. This is not the place to discuss the question, but we may be allowed to express the hope that the views of Charles Francis Adams, Jr., have not been, and may never be, generally received with favor, even within the precincts of Harvard University.

Having secured the objects of the temporary suspension of his pro-

<sup>1</sup> We have authority for saying that the pupil alluded to has never ceased to regret his acceptance of the advice.

fessional studies, and added to his other resources a fair acquaintance with mineralogy and the French language, he entered the office of Dr. Swift, in Easton, in 1824, and began seriously that unbroken succession of labors which ceased only with his death, sixty years thereafter.

In October, 1826, he matriculated in Jefferson Medical College, Philadelphia, then in the third year of its existence, and became the private pupil and intimate friend of its founder, George McClellan, M.D., Professor of Surgery. In consequence of the bitter opposition of the friends of the University of Pennsylvania to the "new school" and its originators, Professors McClellan, N. R. Smith, Eberle, Barton, Barnes, and Rhees, his association with these gentlemen brought upon him the ill-will of many influential men, from which, in a hereditary form, he was never able wholly to emancipate himself as long as he lived. But for this it is probable that he would have never left Philadelphia; and the great West, where he spent his best years, would have been denied the vast benefits of his personal presence and teaching.

He took his degree in the spring of 1828, and then opened an office in Philadelphia, and began at once that series of translations of French and German professional works upon which he spent most of the ensuing eighteen months. His practice at this time was exceedingly meagre, and starvation was staring him in the face, but this did not deter him. On the contrary, he was convinced that he could not only provide for himself but for *another*, who was equally brave to place herself by his side and share in his trials; and, it may be added, that never was a union of two loving hearts productive of greater mutual happiness.

During the eighteen months he spent in a Philadelphia boarding-house, vainly endeavoring to obtain a livelihood by the practice of his profession, he made the acquaintance of a number of gentlemen who became more or less prominent in different departments of work, of whom no one seemed to make so deep an impression upon his mind and heart as Dr. John D. Godman, the anatomist, naturalist, and author; the account of whose literary and scientific pursuits, as lecturer and writer, his desperate but futile contest with poverty, and his early death, fills two or three of the most interesting pages of the book.

He subsequently removed to Easton, and there he found the more lucrative field he sought, but it must not be supposed, however, that his pen was allowed to rest during this period of active outdoor work. On the contrary, he found time to write and publish a large octavo volume entitled *The Anatomy, Physiology, and Diseases of the Bones and Joints*, and a complete treatise upon descriptive human anatomy, which latter, however, was never committed to the press. In the former he was the first to call attention to the great assistance derived from the use of adhesive plaster in the treatment of fractures, a fact which he had observed in the practice of his former preceptor, Dr. Swift. It was at this time also that he was elected Professor of Chemistry in Lafayette College, at Easton, Pennsylvania. But as this was only a nominal appointment, nothing came of it. Indeed it was quite evident that he had no serious idea of occupying a chair, for the duties of which he confessed his total lack of fitness.

In the twenty-ninth year of his age Dr. Gross entered upon his long and brilliant career as a public teacher. He had accepted in 1833 the position of Demonstrator of Anatomy in the Medical College of Ohio, and in October of that year he removed to Cincinnati.



And here, too, began that series of annoyances—some of them ranking as positive and protracted vexations—to which he was more or less subjected through the envy and jealousy of open enemies and false friends, throughout his entire stay in the West. We do not desire to dwell upon this feature of his experience, but as it had an important bearing upon his subsequent history—as may be clearly shown by his unpublished letters—and may serve to correct the inference, which is likely to be drawn from the perusal of these pages, that his professional advances were always accomplished under a cloudless sky, we have only to accompany him to Louisville, Ky., whither he was called in 1840, to take the chair of Surgery in the Medical Institute of that city. But, not to anticipate, let us dwell a little longer upon his life in Cincinnati.

In 1835 he accepted the chair of Pathological Anatomy in the Medical Department of the Cincinnati College, then in process of organization under the leadership of Dr. Daniel Drake, who was already a noted teacher, having been a member of the faculty of the Medical Department of Transylvania University, at Lexington, Ky.; of the Medical College of Ohio, of which he was the founder; and of Jefferson Medical College, Philadelphia.

Dr. Drake, who was his senior by twenty years, and a man of very eccentric disposition, conceived a very great fancy for the young professor. This was fully returned, and soon ripened into an intimate friendship, which flowed on with increasing volume, and scarcely a ripple, until the death of the former in 1852. They were associated together in teaching, not only in Cincinnati, but subsequently, for many years, at Louisville, where they formed the two grand pillars of the medical college.

Dr. Gross's success in Cincinnati, as a teacher, a practitioner, and a leader in intellectual and polite society, was almost phenomenal; and when he left there a sensible void was produced in each one of these circles. He gives graphic descriptions of many of the noted workers with whom he became acquainted there, such as Nicholas Longworth, Lyman Beecher, Salmon P. Chase, Bishop, afterward Archbishop, Purcell, General, afterward President, Harrison, Bishop McIlvaine, Doctor Gamaliel Bailey, Dr. Drake, and others.

While here he wrote his great work on *Pathological Anatomy*, which made him not less famous abroad than in his own country, besides several valuable contributions to the *Western Journal of the Medical and Physical Sciences*. It was at this time, also, that he was offered and declined the professorship of Medicine in the University of Virginia, and the chair of Anatomy in the University of Louisiana.

The Louisville Medical Institute, afterward called the Medical Department of the University of Louisville, was founded in 1836 (?) by a secession from Transylvania Medical College, consisting of Professors Charles Caldwell, John Easton Cooke, Charles W. Short, and Lunsford P. Yandell, who added to their number Henry Miller and Joshua H. Flint, the latter a fresh importation from Boston, to fill the chair of Surgery, and, three years later, the illustrious Dr. Drake, probably the most brilliant teacher, philosophical thinker, and powerful writer that the medical profession of the West has ever produced. Dr. Flint,<sup>1</sup> having proved an utter

<sup>1</sup> It is scarcely necessary to warn the reader against confounding with this gentleman the distinguished Professor Austin Flint, who entered the school some years later, and subsequently obtained a world-wide reputation as a teacher and writer.

failure, was compelled to retire in 1840, and Dr. Gross, who had never been engaged in teaching surgery, invited to occupy the vacant chair. The result of Dr. Flint's displacement added fuel to the flame of bitter resentment which had already manifested itself on the part of a large majority of the physicians of the city, none of whom had been invited to assist in the organization of the school. It may be readily imagined, therefore, that the appearance of Dr. Gross, another stranger, upon the scene was not calculated to allay the excitement, as may be learned from the facts stated in his Autobiography, and confirmed by abundant concurrent testimony.

Notwithstanding the triumph he soon achieved, the feeling of hostility continued with more or less force during his entire residence in the city; and such is the cancerous nature of enmity originating in jealousy and wounded *amour propre*, that some who were thus affected cursed the good man to whom they viciously ascribed their injury, long after he personally disappeared from their view. For this opposition and hatred he was, however, more than compensated by his great success as a lecturer and practitioner, and the numerous ardent friendships which he rapidly contracted with the best citizens of the town. Indeed, we hazard nothing in saying that no man, whether in or out of the profession, ever lived in Louisville, or possibly within the limits of Kentucky—Henry Clay alone excepted—to whom so many people became so strongly attached. He was a favorite with men, women, and children, rich and poor, white and black, bond and free, and when, at the end of sixteen years, he intimated his intention to remove to another field of labor, the whole community seemed to raise their hands and voices in earnest protest.

It should not be forgotten in this connection that Mrs. Gross was in her sphere quite as successful in captivating the hearts of the people as her illustrious husband. Her urbane manners, her intellectual acquirements, her sunny temperament, her remarkable powers of adaption, and her open-hearted hospitality rendered her parlors a rendezvous of agreeable and intelligent men and women nearly every evening in the week. Some idea of the powerful influence she excited upon him personally, and the great consolation which she afforded him in the midst of his many cares and anxieties, is manifest throughout the history of his entire married life. He loved her intensely, admired her exalted character, and was proud of the position which was accorded to her in general society. It is delightful to read the evidences of his great affection for her as they unconsciously break out in different parts of the record, and inexpressibly sad to witness the deep grief by which he was overcome, when, in 1876, she was laid away in her earthly grave at Woodlands Cemetery, Philadelphia. The high eulogiums which he pronounces upon her in the later pages of his memoirs are fully sustained by the undimmed remembrance of her surviving friends. She was a noble Christian woman, and added lustre to the name and fame of her noble husband.

Although Professor Gross passed the best years of his life in Louisville—sixteen in number, including the single winter he spent in New York as Professor of Surgery in the University of New York—it is a little singular that his record of this period does not extend beyond thirty-four pages, more than twenty of which are devoted to brief, but interesting notices of some of the distinguished people with whom he

became acquainted while there. The list of these includes Henry Clay, John J. Crittenden, James Guthrie, James P. Espy—popularly known as the “Storm King”; von Raumer, the distinguished German historian—of whom a very remarkable incident is told; Reverend Robert J., Wm. C., and General John C. Breckinridge; W. J. Graves, the well-known survivor of a noted duel fought with Mr. Cilley, a fellow-townsmen, and other less-distinguished characters. He also tells of his original investigations in wounds of the intestines by means of numerous experiments upon dogs, and of the treatise which he published upon this subject; of the composition of his work upon *Foreign Bodies in the Air-Passages*, the well-known volume upon *Diseases and Injuries of the Bladder and Urethra*, and his valuable *History of Kentucky Surgery*, in which last he disinterred the immortal remains of Dr. Ephraim McDowell, of Danville, the almost-forgotten originator of ovariectomy. During this period he also contributed liberally to the pages of the *Western Journal of Medicine*; and, after the death of this periodical, joined Dr. T. G. Richardson in establishing the *Louisville Review*, which was soon afterward transferred to Philadelphia, much extended in its scope, and published under the title of *The North American Medico-Chirurgical Review*.

It is remarkable, however, that but little reference is here made to his professional life, and his relations to his colleagues. It is true that he wrote brief memoirs of Caldwell, Drake, and Miller after their death, but there is a singular omission of any definite account of one or more affairs which were freely discussed in the public prints of that day, and became an essential part of the history of the medical school. Many of the readers of the autobiography might, therefore, suppose that there was nothing of special interest to relate in this connection, but, on the contrary, there is good reason to know, from personal knowledge of his private correspondence, that there was much to disturb his life, and sufficient in its unpleasantness to exert a decided influence upon his decision when he was invited to take the chair of Surgery in the City of New York, and subsequently in the Jefferson Medical College of Philadelphia.

It is sad, but, unfortunately, true, that in the history of medical education in this country, it is difficult to point to a single medical faculty in which the presence of inharmonious elements has not seriously marred or absolutely destroyed the usefulness of these institutions. The too-popular belief that the profession of medicine necessarily engenders antagonisms between its practitioners, is strongly substantiated by the histories of our medical faculties; and we do not hesitate, therefore, to say to all unfledged public teachers of medicine, that if they aspire at the same time to lives of peacefulness, they are upon the wrong route. We have already had some of the experiences of Professor Gross in the Medical College of Ohio and the Cincinnati Medical College related to us, but we miss the same frank expressions in regard to the school at Louisville. This institution was no exception to the others, as we learn from the newspapers of the time, in connection with the shovelling of Professor Caldwell out of the faculty in 1849. Some reference is made to this ugly procedure in the biographical sketch of the latter just alluded to, but the very strong Anglo-Saxon terms in which our author then expressed his indignation are considerably modified in the text.

As we have already seen, Professor Gross accepted the chair of Surgery in Jefferson Medical College in 1856, and removed the same year



to Philadelphia, where he passed the remainder of his days in comparative quietude of mind, and the active pursuit of his profession as practitioner, teacher, and writer. His distinction as a surgeon soon brought him patients; and notwithstanding the small size of Philadelphia fees—of which he expresses his disapprobation in almost contemptuous terms—he was soon in receipt of an income, which, added to that from the school, made him quite independent, but did not diminish the laboriousness of his daily life. His literary work alone would have more than occupied the entire time of almost any one else, to which the six revised editions of his two great volumes upon *General Surgery* (begun, it is true, in Louisville); the revision (or rather rewriting) of his book upon *Pathological Anatomy*, and of the composition of his work upon *Diseases of the Urinary Bladder*, etc., together with numberless smaller contributions, bear ample testimony. Except for his vigorous bodily constitution, his well-trained mind, and his habits of regularity and sobriety—and, we may add, his cheerfulness of disposition—his years would certainly have been much shortened. As it was, he continued to teach until he was seventy-seven years of age, and did not intermit his daily labors until his death, two years later. As before stated, his professional relations were, for the most part, of an unusually agreeable nature; and as he outlived all his original colleagues, he has embalmed their pleasant memories with those of numerous other friends in biographical sketches, which appear at the close of the second volume.

The account which he here gives us of his private life, his food, drink, and sleep, his amusements, his methods of work, his religion, his miscellaneous reading, his manner of entertaining his friends, and the sketches which he furnishes of the different members of his family, especially his much-loved wife, and of numerous friends and distinguished strangers who partook of his generous hospitality from time to time, are most entertaining and instructive, but must be read in his own well-chosen words to be appreciated. He talks upon almost every conceivable subject of popular and scientific interest, evolution, religion, public amusements, politics, pistols, longevity, pictures, natural scenery, marriage, etc. (the list is made at random), including matters of a much more professional character.

To most readers, however, his more or less extended notices of public men will probably prove most attractive. These occupy not less than three-fourths of the record made after his removal to Philadelphia, not counting the *forty-seven* distinct biographical sketches just referred to as appended to the second volume. There was not a man of distinction of any department of life, whether in this country or abroad, with whom he came in contact, of whom something has not been jotted down, and more or less amplified. Some of these sketches, especially those of Drs. Drake, Dunglison, Sims, Hays, Mott, and Meigs, Archbishop Wood, and Mr. Carey, are permeated by the aroma of true heartfelt affection, and are written in his best style. The one devoted to Dr. Drake fills a dozen pages, and is a worthy tribute of admiration and love to one of the most remarkable men which the medical profession of this country has yet produced.

Professor Gross visited Europe for the first time in 1868. He was then in his sixty-third year, and at the zenith of his fame. He was, of course, received with open arms by the leading men of the profession wherever he went, and every possible means of pleasure and instruction

placed at his disposal. His account of this visit occupies more than a hundred pages, and is replete with most interesting comments upon places and people. In his wanderings upon the continent, no single spot seems to have delighted him more than the old town of Berne, in Switzerland, the interest in which centred in the house in which Albert von Haller lived for many years, and in which he finally died. From the time he began the study of medicine he was a great admirer of the celebrated Swiss physiologist, and evinced his regard by giving the name to his youngest son, now a well-known lawyer and *littérateur* of Philadelphia, and joint editor with his distinguished brother, Professor S. W. Gross, in the editorship of these memoirs.

In Vienna, Rokitsansky, the celebrated pathological anatomist, was found in his workshop, surrounded by his pupils, and in the midst of a necroscopic examination. Indeed, it is difficult to conceive of this wonderful worker being found anywhere else, considering that he has made not less than *fifty thousand* such examinations; and yet, we are told, that "he finds leisure to frequent the opera and the concert, and to give social entertainments, especially musical soirées, being very fond of music and a good performer on the flute."

Billroth, the famous surgeon, was equally cordial, and invited him into his lecture-room, where he was engaged in what appears to have been an utterly useless exsection of a cancerous rectum; and while he impressed his visitor as being a man of unusual ability, great resources, and large capacity for labor, he did not captivate him by his bold and almost reckless use of the scalpel. Dr. Gross adds to his lively description of the man—"Billroth is a good liver, fond of society, a composer, and a superior pianist; in a word, a remarkable person, such as is rarely found in any profession."

In Berlin, he called first upon Virchow, who was also engaged in making a pathological demonstration upon a cadaver, but stopped to salute him and introduce him to the class, and after the lecture showed him through his extensive and thoroughly equipped laboratory and museum, exhibited his large collection of infantile syphilitic hearts and livers, and explained his thorough and painstaking method of practical teaching by means of the scalpel and microscope. As is well known, Virchow is also a statesman of the republican school, and a leading member of the Reichstag. He gave Professor Gross a large entertainment, which was succeeded by the following remarkable exhibition of regard:

"After the viands were pretty well disposed of, our host, availing himself of a lull in the conversation, drew forth a large volume from under the table, and rising he took me by the hand, and made me an address in German, complimenting me upon my labors as a pathological anatomist, and referring to the work, which happened to be the second edition of my *Elements of Pathological Anatomy*, as one from the study of which he had derived much useful instruction, and one which he always consulted with much pleasure. I need not say how deeply flattered I felt by this great honor, so unexpectedly and so handsomely bestowed upon me by this renowned man. I felt that I had not labored in vain, and that the compliment was more than an equivalent for all the toil and anxiety which the work had cost me."

Von Langenbeck was unremitting in his polite attentions:

"He invited me to his house, showed me everything about his hospital, introduced me to his class, and took special pains to perform upon the dead

subject some operations in which he had acquired unusual distinction. As an operative surgeon he enjoys an unrivalled reputation on the Continent of Europe; and it is questionable whether he has ever had a superior in this branch of the healing art anywhere—Dupuytren, Lisfranc, Mott, Liston, Syme, and Fergusson not excepted. . . . In visiting his wards he pointed out to me three cases of excision of the shoulder, two of the elbow, one of the wrist, one of the hip, one of the knee, and two of the ankle, together with one of the shaft of the humerus, and one of both bones of the leg. . . . In all such operations, as well as in recent fractures, whether simple or compound, he applies at once a thick, immovable plaster-of-Paris splint, provided with fenestra for drainage."

His next call was upon von Gräfe, and the account which he gives of this remarkable man, his general appearance, his beautiful countenance, his winning, child-like manners, his great benevolence of character, his style of lecturing, his mode of operating for cataract, and the vast amount of work which he performed from day to day, is given with a vigor and terseness worthy of a Macaulay. It is sad to know that this great ophthalmic surgeon, the reputation of whose judgment and skill had already reached the furthest corner of the civilized world, was removed by death two years afterward (1870) in the forty-second year of his age.

It was here, also, that Professor Gross saw the famous microscopist, C. G. Ehrenberg, blind and superannuated, to whom he bore a letter of congratulation from the American Medical Association, which was afterward published in a pamphlet along with similar testimonials from Agassiz, Gould, Dana, Torrey, and other distinguished scientists, and also a poem addressed to him by Oliver Wendell Holmes.

From Prussia Professor Gross crossed the British Channel, and hurried through London to Oxford, to be present at the annual meeting of the British Medical Association, where he met for the first time Sir James Paget, Professor Rolleston, Mr. Curling, and others of like standing, to whom he was already well known by correspondence and reputation. Thence he proceeded to Cambridge, and on to Norwich, where the British Association for the Advancement of Science was then in session, and where he had the pleasure of shaking hands with Sir James Y. Simpson, J. Hughes Bennett, Broca, Baker, Humphrey, Partridge, and others, by all of whom he was treated with marked distinction. At Edinburgh he was handsomely entertained by Mr. James Syme, than whom, in his opinion, Scotland has probably produced no other so great a surgeon in recent times. While here he was also treated with the greatest kindness and hospitality by Sir James Y. Simpson, who made a very deep impression upon him, not only by his extraordinary personal appearance, but by his charming conversational gifts, his great mental activity, the great variety of his acquirements, and his earnest devotions to the truths of the Christian religion as set forth in the Holy Scriptures.

In Dublin he saw Stokes, Adams, Corrigan, Tufnal, Collis, and others. Of all these famed physicians and surgeons he gives us brief and often life-like descriptions, along with mention of the particular work to which their lives are devoted. Upon his return to Philadelphia, after an absence of five months, a large public reception was given to him, jointly with Dr. Pancoast, by their professional friends.

He repeated his visit to England in 1872, accompanied by Mrs. Gross and their son Haller, mainly to be present at Oxford on the thousandth Commemoration Day of the University, and to receive the degree of



D.C.L. He gives a pleasing account of the ceremony, in which the same honor was conferred upon Prince Hassan (of Egypt), Dr. George Burrows, and Sir Benjamin Brodie (chemist), with sketches of these and several other noted men whom he met there, together with an outline of the remarkable history of the University. In London he was entertained most hospitably, visited with great interest St. Thomas's and King's College Hospitals, listened to the Harveian oration by Dr. Farre, was present at the anniversary dinner of the Royal College of Physicians, and subsequently of the Fellows of the Royal College of Surgeons, upon all which occasions he received marked attention, which, however, is only incidentally referred to in the narrative.

The next chapter, the XIVth, in the volume, containing less than thirty pages, embraces a period of nearly *five years*, and we cannot help thinking that large omissions have been made here by the editors. Less than two pages are devoted to the meeting, in 1876, of the Centennial Medical Congress, the organization of which we know, from other sources, was not accomplished without some heart-burnings and jealousies.

We have here a notice of the meeting of the American Public Health Association in Philadelphia in 1874, at which he introduced resolutions petitioning Congress to establish a National Bureau of Health, with branches at the seat of each State and Territorial Government. He supported these resolutions by a short but striking address, and they were unanimously passed, but with what result we need not stop here to indicate, as the object is only to show that he was the author of the plan adopted in part by Congress four years later, in the creation of the National Board of Health, a scheme which met with most ungenerous treatment by many members of the medical profession, some of the medical journals, and not a few politicians, with the effect, as everybody knows, of practically crushing it out of existence in a very little while after it was put in force.

But the most marked feature, in this chapter, is the account of the sickness and death of Mrs. Gross, in February, 1876, and a short sketch of her life and character. He delights to dwell upon her excellent qualities as wife and mother, her Christian principles, her intellectual attainments, her cheerfulness of spirits, and her remarkable adaptability to the personal varieties of society. It is refreshing and beautiful to see with what tenderness he clings to her memory in his after-life.

In the record for 1877 we find first a notice of four or five pages in length of Sir William Fergusson, who died in February. He analyzes his qualities as lecturer, operator, and writer, and ascribes his fame mainly to his dexterity with the knife. Next comes an account of a visit to Baltimore and Washington, and the people he met. Then his attendance at Chicago upon the meeting of the American Medical Association. And lastly, a visit to Boston to be present at the commencement of Harvard University. Here he met and describes his friends, Drs. Bowditch, J. B. S. Jackson, and E. H. Clark, and called upon Dr. Jacob Bigelow, who was then in his ninety-second year, blind and bedridden, to whom he ascribes merits, both professional and private, of the highest order.

The record for 1878 is largely occupied with reminiscences of medical men, such as Drs. L. P. Yandell, Washington L. Atlee, and J. B. S. Jackson, all of whom had just died, and Drs. Carr Lane, William Beau-

mont, and Charles A. Pope, all three of St. Louis, the last mentioned one of his private pupils, and a man of brilliant parts, large acquirements, and distinguished abilities as a teacher and practitioner of surgery.

The following year is marked by two notable events. First, the complimentary dinner given to him by the physicians of Philadelphia, in commemoration of the fifty-first year of his professional life; and, second, his address, at Danville, Ky., at the dedication of the monument erected by the State Medical Society in honor of Dr. Ephraim McDowell. The dinner was a very grand affair, but as an account of it was soon afterward printed and privately circulated by the committee of management, it is only necessary to quote his words to the effect, "That there have been more costly and elaborate dinners, but there never has been one in which there was more rational enjoyment, or in which a more cordial and tender feeling was manifested for the man whom it was designed to honor."

During this year, while in attendance upon the meeting of the American Medical Association at Atlanta, he attempted to organize the Convention of Medical Colleges which had been called, at his instance, the year before, by the American Medical College Association, for the purpose of pledging the colleges, or a majority of them, to certain improvements in teaching, more particularly in the way of demanding a certain grade of preliminary acquirements, and increasing the requirement of attendance upon lectures from two courses to three. This meeting, from which he "had originally expected so much, adjourned *sine die* at the close of the second day's proceedings, thus ending, like its two predecessors, in "smoke."

The entries of 1880 occupy *sixty* pages, and are full of interest, but, unfortunately, they must be passed over here with but bare notices of their contents. First there are charmingly written reminiscences of Drs. John Kearny Rodgers, David Hosack, and John W. Francis, all of New York, and long since dead—the last to go was Dr. Francis, in 1881.

Next comes an account of his visit to New Orleans. He was present at the commencement of the Medical Department of the University of Louisiana, on which occasion, in some remarks he made to the graduates, he characterized the late Dr. Stone as the "Great Commoner" of his profession, as Henry Clay was in politics. While in the city he was entertained at a public dinner given to him by the two local medical societies, and was treated with profuse hospitality at several private houses. He was very particular to call upon the widows of Drs. Charles A. Luzenberg and Warren Stone, and gives graphic descriptions of the interviews, and reminiscences of these two distinguished surgeons.

After his return to Philadelphia, he proceeded to New York to attend the meeting of the American Medical College Association and the American Medical Association. He was President of the former, and was much elated by its adoption of a resolution requiring the attendance of three courses of lectures obligatory upon the student before becoming a candidate for graduation.

"This important regulation is to go into operation in 1882-83, and there is little doubt in my mind that it will be generally adopted by the schools of the country by that time. When this object, so long prayed for by the leading physicians of the country, as well as by many of our more intelligent laymen, shall be attained, the nation will have cause to congratulate itself upon an event which cannot fail to be of vast benefit to it."

The failure of nearly all the schools, including the one of which he himself was the most distinguished professor, to adopt this course, was, subsequently, a source of great sorrow to him as well as to many others who had labored with him to effect this great advance upon our present system of medical teaching.

After the adjournment of the American Medical Association, he succeeded in organizing the American Surgical Association, initiated by him the previous year at Atlanta, and for which he had made every preparation by correspondence and personal interviews with many of the leading surgeons of the country. He was greatly mortified, however, when he found that the surgeons of New York, with possibly one exception, held aloof from the movement. He was made President, and lived long enough to see the Association under full headway, and with the prospect of a successful and brilliant career. He was elected by acclamation to the presidency for two succeeding years when he positively refused to accept the position again.

A few weeks later, July 7th, we find him again embarking for England, this time to receive from the University of Cambridge, along with eleven others, the honorary degree of Doctor of Laws, the highest in her gift, and to attend the meeting of the British Medical Association. The conferring of the degree was accompanied by a good deal of solemn and impressive ceremony.

After the numerous hospitalities, which continued for several days succeeding the grand ceremony, Professor Gross and his son returned to London, and thence to America, having been absent scarcely two months. Considering that he was then in his seventy-sixth year, it is not surprising that the numerous entertainments, breakfasts, luncheons, dinners, and suppers which he was compelled to attend during his stay in England, and six days' severe seasickness on the voyage back, should have pretty nearly put an end to his powers of endurance, and rendered his entrance into his own quiet house one of the happiest events of his long life. This desire for rest, of which he then felt the need more than ever before, may possibly account for the fact that we hear nothing more from him for seven months, when, on April 3, 1881, he has just received a letter from Sir William MacCormac, Secretary, inviting him to deliver an address at the ensuing meeting, in August, of the International Medical Congress, in London. He was obliged to decline in consequence of age and the dread of seasickness, but suggested the names of five American physicians, of whom Dr. Billings was selected. We need not stop to descant upon the wisdom of the choice, nor upon the distinguished ability with which the honor was in due time sustained.

This year, 1882, is specially marked by his resignation of the chair of surgery in the Jefferson Medical College, which position he had held for twenty-six years. He was succeeded, as is well known, by his son, Dr. S. W. Gross, as Professor of Principles of Surgery, and Dr. J. H. Brinton, Professor of Practice of Surgery.

In November, Professor Gross attended a large reception given to him in New York, by Dr. J. Marion Sims and his son H. Marion Sims. Two or three hundred distinguished guests, many of these not members of the medical profession and drawn from several of the adjacent cities, were present. The account of this grand entertainment, probably the most brilliant of its kind ever given in this country by one private gentleman to another, is more than modestly brief, but it is followed by



an extended biographical sketch of Dr. Sims, prompted by the author's warmest regard and admiration, and written in his most effective style.

"When the history of American Medicine shall be written," he says, "one of its brightest pages will be an account of the services of Dr. Sims, a name as enduring as the hills and valleys of South Carolina, his native State."

In March of the next year Professor Gross accepted an invitation to deliver the valedictory address to the graduating class of Bellevue Hospital Medical College, New York, in the course of which address he strenuously urges the young men to study carefully the American code of medical ethics, and to direct their lives in accordance with its sacred teachings.

The next thirty to forty pages of the second volume are devoted mainly to short biographical notices. Austin Flint, Sr., he denominates the American Laennec, and places him in the first rank of medical teachers, writers, and practitioners. Of Oliver Wendell Holmes he expresses the common opinion that his fame as a contributor to the literature of the country has so completely overshadowed acknowledged abilities as professor of anatomy that it is hardly necessary to speak of the latter.

Passing over his attendance at the annual meeting of the American Surgical Association at Cincinnati, where he was made sad by observing that all the old landmarks of the city had been obliterated since he came there forty-three years before to take the position of Demonstrator of Anatomy in the Medical College of Ohio, and over his subsequent attendance upon the meeting of the American Medical Association at Cleveland, Ohio, we come to an excellent disquisition upon marriage, and some of the more frequent causes of discontent between man and wife. He tells what a perfect wife should be, but fails to describe the perfect husband.

Next is a brief statement of his views upon the subject of cremation, and the impetus which his example has given to this procedure has been felt in all parts of the country, and will probably not spend itself until there has been a complete revolution of popular sentiment, in cities at least, in regard to the proper disposition of the dead.

The year closes with an account of the origin of the famous Wistar Parties in Philadelphia, which were suspended in consequence of the civil war, and have been but lately resumed; and with a notice of the life and character of the late Dr. Thomas S. Kirkbride, the celebrated alienist, and of Professor Sophocles, of Harvard University.

The entries made in 1884 comprise a number of reminiscences, and close with a copy of a formal invitation which he himself had just received, inviting him to Edinburgh to receive the honorary degree of Doctor of Laws from the renowned University, and which he was compelled to decline in consequence of his inability to make the journey. Here the diary ceases, but the story of the few remaining days of his life, which went out on May 6th, is given in the preliminary memoir of the late Professor Austin Flint, Sr.

Our task is ended, and we feel that we have fallen far short of even a fair analysis of these two deeply interesting volumes. We have made no comments upon, nor even given a list of Professor Gross's contributions or armamentarium of surgery, nor have we eulogized him as we

might as teacher, writer, and practitioner. To attempt the former seemed out of place, the latter would have been unnecessary and superfluous. All that we can hope is, that we have awakened a desire upon the part of many of our readers to procure the book and read it carefully from beginning to end. The private record of so good and great a man, and so distinguished a surgeon as Professor Gross, is certainly worthy of the closest study, and, were he living, nothing would rejoice his heart so much as to know that the contemplation of his life from this standpoint had reanimated the weak and halting principles of medicine, encouraged the young and ambitious aspirant, and added steadiness of mind and gait to those who are already far advanced upon the ever-ascending road to professional fame.

In conclusion, we earnestly commend the careful perusal of the work, not only to the profession, which was honored by the adoption and enriched by his incessant and well-directed labors, but to the general public, as the record of a life devoted to the best interests of the human race, and the welfare of every living creature. T. G. R.

HÉMORRHAGIES UTÉRINES, ÉTIOLOGIE, DIAGNOSTIC, TRAITEMENT. Par le DOCTEUR SNEGUIREFF, Professeur de Gynécologie à l'Université Impériale de Moscou. Edition Française rédigée par M. H. VARNIER, Interne des Hôpitaux de Paris, sous la direction de M. LE DOCTEUR PINARD, Professeur Agrégé à la Faculté de Paris, Accoucheur de l'Hôpital Laraboisière. Paris: G. Steinheil, Editeur, 1886.

THE ETIOLOGY, DIAGNOSIS, AND TREATMENT OF UTERINE HEMORRHAGES. By DOCTOR SNEGUIREFF.

WHILE uterine hemorrhage is not a disease, but a symptom, it arises from so many different causes, and hence requires for its cure so many different methods of treatment, that a volume like this devoted to its treatment is not inappropriate. And probably in these days, when so much attention is given to tubal diseases, and such brilliant successes are achieved in their diagnosis and operative treatment, it is well that the attention of the gynecologist should be directed to disorders much more frequently met in practice. Quite recently it was our duty to examine a young medical graduate, and to the question as to the difference between menorrhagia and metrorrhagia he could give no reply, and offered definition of neither; on the other hand, when the examination was turned to the tubes he proved omniscient of all salpingian compounds and derivatives; in the new knowledge he had neglected the older and the more important.

This incident confirms us in the view that in such a volume as the one before us we may meet an actual want, and we enter upon its examination with increased interest.

Between thirty and forty of the first pages are given to the general method of diagnosis of diseases of women, but this subject need not detain us. The following part is occupied with the etiology of uterine

hemorrhages. The author divides these causes into organic and reflex, the latter being occasional, or predisposing; the chief of the former are, first, malignant degenerations, then benign, and following these are chronic phlegmasias of the uterus, abortion, pregnancy, and puerperal diseases, uterine displacements, ovarian apoplexies, hemorrhages of the pelvic peritoneum, and disturbances of general nutrition, from obesity, blood stasis, abdominal plethora, and finally, traumatic causes.

A table, prepared by the author, shows the relative frequency of hemorrhages from several of these causes. Thus 3 per cent of uterine hemorrhages result from endometritis, 25 per cent. from cancer, and 19 per cent. from fibromyomata. A second table shows the ages of those suffering from uterine hemorrhages resulting from different causes. In illustration, 58 per cent. of women suffering from metrorrhagia, who have passed forty-five years, have as its cause cancer, and 25 per cent. fibromyomata.

Cancer of the neck of the uterus is next considered. In presenting the symptoms the author directs attention more prominently, we believe, than any one else has to pruritus, which, in some cases, he states, becomes so severe as to render life unendurable; he attributes the disorder to gastro-intestinal complications, and has found that therapeutic means addressed to them have been the most successful in relieving the pruritus. In connection with this topic he also states that some patients, suffering with cancer, are tormented with pruriginous sensations abruptly appearing upon different parts of the body, and suddenly disappearing. These patients are especially liable to a rapid recurrence of cancer after extirpation.

Sneguireff has found in 90 per cent. of cases a characteristic white coloration of the vaginal entrance, and that independently of cancer of the uterus this peculiar white appearance is never presented except in women from sixty to seventy years of age, who are entirely free from diseases of the uterus or of its appendages. It is observed especially at the anterior extremity of the vagina, where there will be found at the level of the inferior border of the meatus two white bands directed along the sides, and they may extend so as to meet below at the level of the fourchette. He considers this white color-line as much more characteristic of cancer than the bluish hue of the vulva, first described by Jacquemin, is of pregnancy; this sign certainly demands the attention of observers.

In considering the subject of medicines employed in cases of uterine cancer the author gives a caution in regard to the use of chloroform, or of medicines acting upon the heart, lest this organ has undergone fatty changes; he mentions, in confirmation of this caution, instances in which the administration of ergot, used for the purpose of arresting hemorrhage, was followed by severe dyspnoea and cyanosis; the same effect, though in a less degree, was observed after the use of digitalis.

Sneguireff, in considering the radical cure of cancer of the neck of the uterus, states that in no form of the disease, whatever operation, slight or grave, be performed, in good or in bad conditions, can we be certain there will be no recurrence. "If, then, asked as to this, a vague response should be given; that will be very much better than to flatter the friends of the patient by deceitful assurances which can only discredit surgery and the surgeon."

Cancer and sarcoma of the body and of the fundus of the uterus are



next presented, but the subject is very meagrely considered, and we find no points of special importance.

We are somewhat surprised to find that the author asserts, in the discussion of fibromyomata, that these tumors may be congenital, for in the works of gynecologists in general there will not be found any confirmation of this; indeed, the youngest subject in which such a growth has been found was ten years old, the case of Seigel.

The author makes the following statement as to the progress of cancer, in case this should be one of the complications of uterine fibroids—he has met with seven examples of such complication—that this is especially characterized by its slowness, and the little tendency to invasion of adjacent tissues.

The following chapter discusses chronic metritis, endometritis, and lacerations of the neck of the uterus as causes of uterine hemorrhage, and then the subject of abortion is considered; but nothing worthy of special remark is here presented.

It is not necessary to continue an account of the causes of uterine hemorrhage, as presented by the author, and after a brief reference to the subject of congenital ante flexion of the neck and conical neck, we will pass to that of the treatment. Sneguireff states that ante flexion is the most frequent of developmental anomalies of the uterus. "Of 7599 patients, the number of anomalies of development was 790—that is, 10.40 per cent. Of the 790, 245, or 31.0 per cent., were treated for ante flexions. Add to these the cases of conical neck, 139, and of ante flexion with conical neck, the proportion is 59.11 per cent., so that more than one-half of the total number of congenital vices of conformation belong to ante flexion and conical neck." He further states "that of the different classes of society the middle educated class is more predisposed to this anomaly of development." He adds that much the largest contingent of patients who, in consequence of sterility resulting from ante flexion, come to consult the physician, is furnished by the Israelites. "The reason for this fact, apparently, is that in Russian families sterility is regarded neither as a dishonor nor a cause for divorce, while, for the married Israelites, a sterility of nine years may involve divorce; these women most frequently come after seven or eight years of marriage, seeking cure for their sterile condition."

Under the head of treatment, the author first considers that of metrorrhagia in general, and then of the different varieties in reference to their causation. Nevertheless, all hemorrhages from the womb do not require treatment, for their arrest may be followed by serious consequences, and still others may require very cautious cure. Thus, among beneficial metrorrhagias may be mentioned those observed at the menopause in obese, plethoric women, attacked by an affection of the heart, or of the liver, or suffering with atheroma; so, too, in some diseases of the uterus, in ovaritis, and in ovarian neuralgia, a moderate hemorrhage makes, as it were, part of the treatment. Moreover, if the tubes are involved, and liquid accumulated in them, a condition not unseldom present in chronic metritis, should contractions of the tubes be excited this fluid may be forced into the peritoneal cavity, resulting in a limited or in a general peritonitis; but as almost all the agents used as uterine hæmostatics cause contractions of the uterus and of the appendages, the accident mentioned may result from their use. Great prudence must be used in arresting a metrorrhagia which alternates with hæmoptysis, or

one occurring in nervous persons with hereditary predisposition to organic diseases of the central nervous system.

Among medicines ergot is first considered, the form recommended the infusion, and the cases to which it is thought especially applicable those of hemorrhage following labor or miscarriage—in general, whenever the uterus is increased in size and its tissues softened. The remedy has little effect if the uterus is hard and fibrous, and if then used is to be employed in small doses, or hypodermatically. If the hemorrhage has caused great anæmia, ergot gives but feeble results; it must be administered cautiously if the woman is nursing, lest the secretion of milk lessen or disappear. The perchloride of iron is advised in three-drop doses, three or four times a day, for those patients who have suffered a long time from menorrhagia or metrorrhagia. Digitalis in the form of infusion, is indicated in hemorrhage resulting from blood stasis in the abdomen or pelvis, and also in cardiac affections. The tincture of Indian hemp is valuable only when recently prepared. It responds to the following indications: It calms pelvic pain involving the uterus and its appendages, the bladder and the rectum, lessens the uterine flow, and produces sleep; it is useful to relieve the suffering from chronic metritis, acute perimetritis, and parametritis, in dysmenorrhœa, in vesical irritability, in dysuria, and in painful defecation when the suffering arises from the uterus; second, during pregnancy this agent acts very favorably upon the painful contractions and hemorrhages; third, it is useful in the insomnia accompanying uterine diseases.

Among other uterine hæmostatics recommended are the acid of Haller, five to ten drops, three or four times a day, and phosphoric acid in an unstrained decoction of cinnamon; the former is recommended in the metrorrhagia of pregnancy, or of beginning abortion, and the latter in hemorrhages depending upon the disease of Werlhof and those of scorbutus.

Next follows hydrotherapy in its various applications, very great prominence being justly given to vaginal injections of hot water. In regard to position when the injections are administered, he rejects the sitting, or half sitting, or erect, and insists that, as a rule, the patient should be recumbent: only in exceptional cases where the prompt arrest of an obstinate hemorrhage is desired is she to take the genu-pectoral position. In considering the effect of hot water upon the uterus he gives the following results: Lessened volume of the organ, the diminution being so much more marked as the consistence of the uterus is less; diminution of pain; lessened secretion from the uterus—though at first it may be increased, it soon diminishes and may entirely disappear; in addition to the effect of hot-water injections upon the quantity of the secretion, the quality changes, and thus a leucorrhœa may lose its fetid character. Beside these results hot-water injections furnish the most powerful antiphlogistic means in gynecology. Hot-water injections, especially under the form of continuous irrigation, have a decided sleep-producing power; some patients go to sleep during the injection, and others after it; the sleep is brief, usually unattended by dreams, and is refreshing. In some cases, however, which are quite rare, hot injections cause sleeplessness, hallucinations, or even syncope, and then, of course, they should be abandoned. Among other unpleasant symptoms that may result are acceleration of the pulse, which may become irregular, palpitation of the heart, cardiac distress, hurried respiration, which may even present

some asthmatic characters. Vertigo, dimness of vision, and ringing in the ears may also occur, and when these are observed, of course, the injections must be at once discontinued. We know no writer who has entered so fully into the subject of hot-water vaginal injections, and we regard this portion of his work as of the greatest value; he, of course, acknowledges indebtedness to Emmet for this means of treating diseases of women.

The subject of continuous irrigation in puerperal fever is presented with considerable fulness, the writer having collected more than fifty cases in which this treatment was employed, but the propriety of introducing this subject in a work devoted to uterine hemorrhages is at least doubtful.

Cold injections, both intermittent and continuous, are considered, but since the author states he has abandoned them as hæmostatic means, no further reference need be made to the topic. He regards the use of ice in the vagina in the slighter forms of hemorrhage as useful; and so too, an ice bladder may be applied to the abdomen in conjunction with hot-water injections in the vagina: he gives a just caution in reference to the external use of ice, stating that in very anæmic and fleshy women the prolonged application of bladders of ice ought to be carefully watched, for frequently in fact superficial eschars are observed, especially if the patients have previously had irritant ointments applied, or continued application of hot compresses.

Revulsion to the surface by means of hot-water bags, *et cetera*, is briefly presented, as well as the similarly produced ischæmia of the internal organs by means of a hot bath. The value of special treatment by hydrotherapy is presented. He regards this treatment as useful in the hemorrhage due to obesity, in that which is associated with abdominal plethora in connection with intestinal atony and obstinate constipation, the uterus not having undergone malignant degeneration; in uterine displacements, especially retroflexion or retroposition with or without inflammation or tumors of the ovary; in subperitoneal or interstitial fibromata; in the hemorrhages of the menopause, and in those of chronic metritis. He warns against the danger from the application of cold water in the case of a patient who has previously had peritonitis, of a return of the disease, and also states the discouraging fact that in some cases the cure by hydrotherapeutic treatment is not permanent, and must be resumed a second or even a third year.

Intrauterine injections are briefly referred to. The author advises for these Braun's syringe, and regards tincture of iodine, one part to four of glycerine, or else the undiluted tincture, the best material for injecting; such a preparation as either would be a very feeble hæmostatic indeed, and probably the alcohol is really the most important agent, the quantity of iodine being so small. After giving the precautions necessary in case of hæmostatic uterine injections, he states that even with the utmost care the latter are not exempt from danger, and that they ought to be rarely employed.

Mechanical means, including the vaginal and the uterine tampon and massage, are presented, as well as hygienic and dietetic care pointed out. Next follows a chapter devoted to sun baths, for the use of which the author acknowledges his indebtedness to Emmet. These baths are prescribed for all patients who have suffered for a long time with affections of the genital organs, and have undergone various treatments, chiefly



cases of chronic metritis, chronic inflammation of the ovaries, of the peritoneum, with intestinal atony, dyspepsia, hysteria. The baths are taken in the following manner: The patient has the abdomen and lower limbs covered with black clothing, the chest and head with white; she lies extended upon a bed or couch in the full sun, an umbrella protecting the upper part of the body, while the abdomen and lower limbs are uncovered. For the first half hour she remains upon her back, and then turns upon her side, or upon her abdomen; the bath lasts from one to two hours. In some cases twenty, in others sixty baths are employed.

The final portion of the volume is occupied with the treatment of the different affections causing metrorrhagia. Here we have presented the medical and surgical means used in malignant and in benign uterine growths, including abdominal and vaginal extirpation of the uterus, the treatment of endocervicitis and of endometritis, of bilateral laceration of the cervix by Emmet's method, of chronic metritis, of hemorrhage from abortion and during pregnancy, of the various positional disorders of the uterus, and other affections resulting in metrorrhagia. But having already occupied so much space with this notice, there is hardly room left to consider these several topics.

We have endeavored to present a fair analysis of this volume, and we think our readers will agree with us in concluding that the author has prepared a work which will prove quite useful to the profession.

T. P.

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DERMATITIS VENENATA: AN ACCOUNT OF THE ACTION OF EXTERNAL IRRITANTS UPON THE SKIN. By JAMES C. WHITE, M.D., Professor of Dermatology, Harvard University. Pp. 203. Boston: 1887.

THE author of the book before us is a botanist as well as a distinguished dermatologist, and is, therefore, eminently qualified to deal with the subject in hand in its several aspects. We may state that the subject-matter has been prepared from a practical standpoint, supported by scientific methods of observation. It is an admirable essay, original and broad in its scope, and constitutes a valuable contribution to dermatology.

Under the title *dermatitis venenata* are included all those forms of inflammation of the skin which are produced by the direct action of irritating agencies externally applied, belonging to the vegetable, animal, and mineral worlds, and to other classes of matter more difficult of definition. Most frequently the inflammation is due to plants possessing irritating properties, but numerous other irritant substances, such, for example, as chemicals, dyes, and certain insects, also not infrequently act injuriously upon the integument. The effect produced upon the skin in all cases is an inflammation, varying greatly in degree and intensity, from a mild erythema to a severe and deep-seated disturbance. All grades and forms of the inflammatory process are met with. Erythema may appear as a defined lesion, a macule, or as a patch, and is usually accompanied with oedema, which is often marked, as, for example, in *dermatitis from rhus*. The wheal, papule, vesicle, bleb, and pustule, as well as the scale, crust, excoriation, ulcer, and scar, may all be modes of pathological expression.

The description given by the author of the intimate cutaneous changes that take place in these several forms of inflammation is original, and is presented with a masterly hand. In some cases the diagnosis of dermatitis venenata must rest alone with the history or etiology, the signs of inflammation being similar, if not identical, with other forms of disease arising from internal causes. Especially is this true where the subject attacked is eczematous—that is, is prone, from one cause or another, to outbreaks of eczema, of which instances in practice are, as is well known, sufficiently numerous.

The author first takes up dermatitis produced by plants, of which there are many capable of causing more or less cutaneous inflammatory disturbance. The list is by no means small, sixty being mentioned, which are either native or have been introduced into the United States. Of these we may distinguish those which are capable of producing injurious effects while growing, either by direct contact or near approach; those which act only when some part is purposely applied to the skin; and, thirdly, those which are active only in a concentrated form or through some principle artificially extracted from them. Some of these act by mechanical irritation, as, for example, the hairs of *mucuna*; some by special poison glands, as the stinging glands of the *urticæ*; some by emanations, as the volatile principle in *rhus*; others by contact with the acid or poisonous elements contained in the plants. Among the most poisonous, and those producing by far the most mischief on the skin, stand the *anacardiaceæ*, or *rhus* family, of which three species grow abundantly in the United States, namely, *rhus toxicodendron*, or poison ivy; *rhus venenata*, or poison sumach; and *rhus diversiloba*, or poison oak. *Rhus toxicodendron*, called by earlier botanists *r. radicans*, is also popularly known as poison vine, poison oak, and mercury. The second species, *rhus venenata*, the *r. vernix* of Linnæus, is also known as poison dogwood, poison elder, poison ash, and is a tree growing mostly in swampy places, reaching the height of about twenty feet. *Rhus diversiloba* is the common poison oak of the Pacific coast, and closely resembles *rhus toxicodendron*.

Dr. White gives a full and interesting account of these plants, directing special attention to points whereby they may be at all times readily distinguished, together with a complete description of the eruption, its peculiarities, and its treatment. While the numerous remedies which have been found to be more or less useful in the local treatment of this inflammation are briefly mentioned by the author, the excellent results to be derived from some of them are, we think, not referred to sufficiently. Thus, the great value of *grindelia robusta*, especially in the form of a fluid extract, largely diluted, is not specially mentioned. It is certainly one of our best remedies. The author is firmly of the opinion that there are no so-called specifics for this affection, black-wash, employed either alone or with some mild ointment or powder, as in vesicular eczema, being regarded for the majority of cases as by far the best application. In dispensary practice the following is generally prescribed: *zinci oxidi*, *ʒiv*; *acidi carbolici*, *ʒi*; *aq. calcis*, *Oj*.

The other plants, of importance, are *arnica* (used in the form of a tincture as a domestic remedy for bruises and sprains), which is capable of giving rise to a virulent dermatitis; white-weed, or ox-eye daisy; croton oil; goa powder; cowhage; and nettle. Next in order may be noted a list of other irritants, some organic, others inorganic, which

occasionally work mischief on the skin, many of which, such as arsenic, mercury, sulphur, tar, carbolic and salicylic acids, are, when properly employed, most useful remedies. Finally, irritants belonging to the animal kingdom, such as the mosquito, gnat, bed-bug, flea, itch insect, louse, spider, and caterpillar, receive brief consideration from the author.

Thus, it will be seen that Dr. White has opened a new field in dermatology, and has collected and brought together much practical information that before only existed in the form of widely scattered papers. The work has been well done, and we take pleasure in commending the volume to all who are in any way interested in the subject.

L. A. D.

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RESEARCHES UPON THE VENOM OF POISONOUS SERPENTS. By S. WEIR MITCHELL, M.D., Member of the National Academy of Sciences, U. S. A., President of the College of Physicians of Philadelphia, and EDWARD T. REICHERT, M.D., Professor of Physiology in the University of Pennsylvania. Folio pp. ix. 186. 4 Woodcuts and 5 Plates. Washington City: Published by the Smithsonian Institution, 1886.

AN admirable piece of work which has even already won for itself a portion of the recognition its merits deserve, but which will be the starting-point for any more exhaustive investigation of the same nature in the future. A plain statement of facts observed such as is found in these pages is worth volumes of conjecture without experimental evidence to back it, and for that reason the work here recorded must always be of value and can never be neglected in future research upon this important subject—more important, of course, in parts of the world infested by venomous reptiles to a greater degree than are the Middle States of North America, but necessary even there for the possible results in rescuing life from the grasp of such deadly enemies.

The fact of the rarity of venomous reptiles in the region where this investigation was conducted limited its authors in a very serious way, because a large supply of snake venom was out of the question at any one time, so that their experiments were, to a certain extent, limited in time and variety. They have themselves, however, recognized these limitations, and with the modesty of the true scientific spirit claim nothing for their conclusions which is not fully justified by the premises upon which they are based. The work is, in some sort, a continuation of what was begun by Dr. Mitchell as long ago as 1858, and the spirit in which this report is written is well expressed by the authors in the sentence: "We have foreborne to overload this paper with comments on the later researches of others, and have made the discussion of our own work as brief as was consistent with clearness."

The work is divided into eleven chapters, and begins, as is most natural with a consideration of the "Physical Characteristics of Venom," which are fluids varying in color from a very pale amber to a deep yellow. Dried with moderate rapidity they become beautiful cracked masses closely resembling a mass of crystals, which are yellow, very



fragile and translucent, and retain their poisonous properties for years. Under the microscope, especially in vigorous reptiles, the venom shows a number of floating granular bodies which seem to increase in number as the vigor of the reptile decreases; besides these bodies are also found a few leucocytes and epithelial cells, and always micrococci, together with other forms of bacteria in old specimens.

The specific gravities of various species of venom are mentioned.

Following this comes the consideration of the chemical aspect of venoms and several extremely interesting facts are here revealed. Fresh venom, allowed to stand, separates into a viscid fluid and a sediment which contains the granular bodies, epithelial cells, etc., and which, after thorough washing, gives absolutely no toxic reaction when injected into animals. The toxic properties of venom are, therefore, to be looked for in the portion remaining after the removal of this "insoluble precipitate." If this residue be placed in a dialyzer after mixing with water, a whitish precipitate will be thrown down in the dialyzer in abundance if the process be continued long enough. This precipitate, thoroughly washed, gives reactions peculiar to the globulins, and the filtrate obtained in the dialyzer is shown by proper tests to contain readily dialyzable substances which belong among the peptones. The authors, therefore, show that venom contains in varying proportions for different species of reptiles, specimens of two classes of proteid bodies—the one belonging among the globulins, the other among the peptones. The venom-globulin they found to be of a complex nature and capable of being resolved into three principles, each a globulin, by processes which they have given as names to the result—*i. e.*, water-venom-globulin, copper-venom-globulin, and dialysis-venom-globulin. Each of these three substances was subjected to careful tests as to its behavior toward chemical reagents and its identity fully established. This was also done in the case of venom-peptone, and both principles were examined from the *Crotalus adamanteus*, the *Ancistrodon piscivorus*, and the *Cobra*. In the case of the first the dried venom was found to contain 24.6 per cent of globulins, of the second 7.8 per cent., and of the third 1.75 per cent., and necessarily these varying proportions of the globulins and peptones in different venoms are of great importance in explaining the varying physiological peculiarities resulting from poisoning by different species of snakes.

The authors next take up the question of the "Effects of Various Agents on Venom," and employed moist and dry heat for varying periods of time and in varying degrees of intensity upon the venoms of different serpents. Dry heat acting upon dry venom at 230° F. for thirty minutes did not destroy its activity, but moist heat at 212° F. for two minutes took away all of its active power in *Crotalus adamanteus* venom, and was even more marked in its effects upon the venom of the moccasin and cobra. A number of chemical substances were used as tests with varying results upon different venoms.

Various methods of filtration were adopted with a certain amount of success, but snake-bile, the popular remedy for a snake-bite, was tried and found to have absolutely no effect in diminishing the toxic action of the venom with which it was injected.

Their experiments show very conclusively that as a local antidote, permanganate of potash is the best for all snake poisons, and that ferric chloride is a very efficient destroyer of the venom of our own snakes,

which owe their vigor to venom-globulin, but has little value as a local antidote to the peptone, which gives power to the poison of the cobra, and in any case its use is indicated locally in large, full doses. Bromine may prove efficacious as well as the strong alkalies.

The effects of venom when applied to various mucus and serous surfaces was next studied, showing that it might be absorbed with varying rapidity from such situations, and then the action of venom upon the nervous system was taken up. In the latter case all the observations tended to show that the respiratory centre is the most vulnerable point of the nervous system, that the coördinating and volitional centres are those markedly affected, that the sensory part of the spinal cord and the sensory nerves are next attacked, and finally, that the motor parts of the cord and the motor nerves are the last to succumb.

A comparison of the local effects of the globulins and peptones shows a marked difference between the two—in the former case there are local bleedings, fluid blood, and capillaries giving way soon after the poison reaches them—whilst peptone venom produces swift putrefactive changes, and shows but slight capacity to make fluid the blood or to corrode the capillaries.

A long series of experiments to discover the effect of venoms and their globulins and peptones upon the pulse-rate, was made. By this it was found that of the *globulins*, the water-venom-globulin is the most potent, the copper-venom-globulin the least so, whilst the results obtained with venom-peptones agree with those obtained with pure venom, producing a primary increase and a secondary diminution of the pulse-rate—the first effect by excitation of the accelerator centres in the medulla, and that the impulses are carried through fibres passing chiefly by the spinal cord.

The action of venoms and their isolated globulins and peptones upon the arterial pressure, was the next point investigated. The injection of pure venom subcutaneously producing a progressive fall of blood pressure, whilst intravenously the fall is sudden and marked, and may be immediately followed by death; whilst the results of the experiments upon globulins and peptones seemed to justify the conclusions that the isolated principles exert the poisonous actions of pure venoms on the blood pressure, and that their toxic effects are simply different in degree.

Naturally, the next thing to investigate was the effect of these venoms and the venom-globulins and venom-peptones upon the respiration, the results of the experiments upon this point being best given in the words of the authors, that “the primary action of all the above poisons, excepting the copper-venom-globulin, is to cause an increase in the number of respirations, and, secondarily, to diminish the respirations below the normal. Of the different principles, the peptone seems to exert the most decided power in causing the acceleration, while the copper-venom-globulin seems utterly to lack this action.

The experimental evidence offered as regards the pathology of venom is not so satisfactory as the rest of the paper—especially the methods employed for the isolation and cultivation of the bacteria observed in the venoms. The whole history of the action of venoms argues against the fact that their activity is due to the propagation of bacteria in the parts affected by the poison. Nothing, however, prevents the supposition that these poisons may be the *results* of the previous growth of bacteria in the mouths or venom-sacs of the serpents themselves—a point of

extreme importance, and one which these experiments have done nothing to elucidate. This is the more to be regretted because it was an opportunity not likely to occur soon again.

The effects of the various venoms upon the tissues of the body—both macroscopically and microscopically—are well pointed out, and are well explained by the facts observed in the first portion of the treatise. A summary of the conclusions reached closes the text, and a fine bibliography of the literature of the subject fitly ends one of the most creditable scientific productions of recent years. An index and several fine plates leave nothing to be desired.

H. C. E.

LECONS SUR LES MALADIES DU SYSTÈME NERVEUX FAITES A LA SALPÊTRIÈRE. Par J. M. CHARCOT, Professeur a la Faculté de Médecine de Paris, etc. Tome troisième, 8vo. pp. 519. Paris: A Delahaye et E. Lecrosnier, 1887.

LECTURES ON DISEASES OF THE NERVOUS SYSTEM DELIVERED AT THE SALPÊTRIÈRE HOSPITAL. By PROF. J. M. CHARCOT. Vol. III.

THE first two volumes of Charcot's lectures are so widely known, having passed through three editions and having been translated into several languages, that the third volume will be heartily welcomed by his many students and admirers. It contains twenty-six clinical lectures upon various forms of nervous disease, delivered during the past four years at his clinique. The majority have already appeared in the pages of *Le Progrès Médical*, but are well worth a second perusal.

The subjects discussed are muscular atrophy subsequent to joint disease, contractures of traumatic origin, tic convulsif, migraine ophthalmique, myelitis following sciatica, cervical pachymeningitis, aphasia, tremor, the classification of muscular atrophies, and various forms of hysteria. The last named subject has attracted so much attention in France, of late, that it is not surprising that one-half of the lectures are devoted to its study; hysteria in males, hysterical contractures, hysterical monoplegiæ, hysterical coxalgia, hysterical mutism, and the treatment of hysteria by seclusion, being fully discussed. The exact but none the less vivid description of cases, the exhaustive discussion of symptoms with interesting comments, and points of differential diagnosis, and the attractive style of the lectures, combine to make this volume as valuable an acquisition to any medical library as either of its predecessors.

It is possible in a short space, to call attention to only a few of the subjects of special interest which are treated. The classification of muscular atrophies has only recently become possible, several new forms having been described since Charcot's first volume, which contained a reference to the subject, was issued. He groups them in two categories: first, amyotrophies of spinal origin; secondly, primary progressive amyotrophies. In the first category are included (1) the atrophy of amyotrophic lateral sclerosis; and (2) the progressive muscular atrophy of the Duchenne-Aran type. In the second category are grouped (1)



pseudo-hypertrophic paralysis; (2) juvenile muscular atrophy of Erb; (3) progressive infantile muscular atrophy of Duchenne; (4) the hereditary form of progressive atrophy of Leyden; and (5) transitional forms of atrophy in which the muscle, though weakened, is not apparently reduced in size, of which Charcot describes several cases. It seems as though no very sharp line could be drawn between some of these forms, as the transitional cases described resemble two or more varieties. This chapter is profusely illustrated, but the plates are of an inferior kind, though made from photographs, and show less distinctly than could be desired the characteristic features of the various types.

Apropos of a case of disseminated sclerosis tremor is discussed. The tremor of sclerosis ceases during rest, and is increased by voluntary motion or by an effort to restrain it, and the extent of the excursion of the trembling hand may be considerable. In paralysis agitans the tremor continues constantly, is not affected by motion, may be restrained for an instant, and is a fine trembling, each finger moving individually. In both these forms as well as in senile tremor the oscillations are slow, four or five per second. In senile tremor oscillations of the head are quite constantly seen. In hysterical tremor the movement is more rapid, but is not as quick as in the vibratory tremor of alcoholism, mercurial poisoning, general paresis, or Basedow's disease. In the last of these the fingers never tremble individually. Tremor is not to be confounded with choreiform motions which are not oscillatory or vibratory, but are spasmodic twitchings.

The cases of aphasia described, merit careful study, being almost unique. One is the case of a man, who, while retaining his power to speak and to write, had lost the power to read at sight. By the aid of his muscular sense, however, he was able to recognize the meaning of printed language, for when he traced the letters which he saw he became conscious of their significance. Another case was one of defect of visual memory: faces, objects, and scenes once well known, being no longer either voluntarily recalled or recognized when seen. In both these cases homonymous hemianopsia was present; and this symptom is ascribed to a cortical lesion by Charcot, an admission which implies that his previous scheme of the course of the visual tract, which is unfortunately still reproduced in physiological text-books, has been abandoned.

It will probably be a source of disappointment to many readers to find so much space devoted to the subject of hysteria. But much valuable information is to be found in these lectures, which to many will be wholly new. The liability of spiritualistic séances to induce hysterical phenomena is illustrated. The subject of hysteria in the male is one whose importance must be admitted. Cases of this kind are, according to Charcot, by no means rare. "Judging from my daily experience, these cases are often misunderstood even by competent physicians. We all admit that an effeminate young man may present hysterical symptoms, especially after excitement, excesses, or emotional strain. But that a vigorous workman, rough and hardy, as for example, the stoker of an engine, who has never been excitable, at least, to all appearances, may become as hysterical as a female in consequence of the shock of a collision or accident, is a fact which seems to surpass our powers of imagination, but is not the less true. . . . What misleads us chiefly, is the notion that hysteria must necessarily present in males the same clinical pictures as in females. In the male, in fact, the disease is often

characterized by the permanence and tenacity of its symptoms. In the female it is its unstability, the constant change of symptoms, which is considered typical. Yet, even in the female there are symptoms which are permanent and difficult to modify or to relieve by medical means; hence, to affirm that because the symptoms are permanent there must be some organic or dynamic lesion is a fallacy. I hope to prove that the sensory hysterical symptoms even in the female have a remarkable tenacity just as in the male, and, also, that in the male, depression and a tendency to melancholy are observed very often in markedly hysterical cases, and that the variability of symptoms is not the rule" (pp. 252-254). Some very instructive cases are fully described to substantiate these positions. Many points of diagnosis between functional and organic affections are brought out incidentally in these chapters, and those which follow upon special forms of hysteria. Charcot claims the credit of originating the idea of the treatment of hysteria by seclusion, and adds his testimony to its efficacy. He also strongly commends hydrotherapeutic measures.

In one respect this volume offers a contrast to the first two volumes. It is singularly lacking in pathological facts. It was one of the great merits of the earlier volumes that symptoms and lesions were brought into a logical connection, and perhaps their great success was due to the clear, definite pathological facts which give nervous diseases a tangible basis. The lesions of hysteria are still hypothetical, and hence the discussion of the disease is still unsatisfactory. It will be a disappointment to many, that no attempt is made in this volume to find a pathological basis for some of the abnormal functional conditions described. But the exact description of symptoms cannot be without result, and in this respect this volume of Charcot, like its predecessors, is a model for clinicians.

M. A. S.

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A THEORETICAL AND PRACTICAL TREATISE ON ASTIGMATISM. By SWAN M. BURNETT, M.D., Professor of Ophthalmology and Otology in the University of Georgetown, D. C. With fifty-nine diagrams and illustrations. 8vo. pp. viii. 246. St. Louis: J. H. Chambers & Co., 1887.

IN this book of two hundred and fifty pages, the author has given us a fair treatise on astigmatism, and a very good bibliography of the subject.

The body of the work is divided into thirteen chapters, each of which has its separate bibliography. This necessitates a good deal of repetition, the same paper or work often bearing on the subject matter of several chapters, and also compels the reader sometimes to look over more than one list to find the reference sought. This, however, is not any great labor, since in each list the authors' names are arranged in alphabetical order. The author, in the preface, states his belief that he has recorded here "the title of every important paper on the subject that has appeared up to the year of grace, 1886." The bibliography is certainly very complete, but we fail to find in it any mention of the brief but exceedingly important communication of Prof. Stokes to the

British Association for the Advancement of Science, in which he described the lens that has since borne his name.

The mathematical portion of the work presupposes, on the reader's part, a fair acquaintance with the elementary principles of the subject, yet it is not written in the laconic, rigid style often adopted in treatises of the higher mathematics, and which is found most pleasing and serviceable to the advanced student; but the whole work is written in good English.

To one who has studied ophthalmology by the aid of our common English text-books, the following will be somewhat startling in its originality. "The asthenopia of astigmatism is of two kinds, which are usually denominated *muscular* and *nervous*. The first named form has its seat in the muscle of accommodation, being sometimes called accommodative asthenopia," etc. Now, following Gräfe and Donders, who proposed these terms, we have been accustomed to divide asthenopia into accommodative and muscular; the muscular being that variety which is *not* seated in the muscle of accommodation, but is wholly independent of it, arising in connection with the use of extra-ocular muscles. If the author desired to give to the term "muscular asthenopia" a new significance; and deliberately set out so to do, we think he should, to avoid confusing his readers, have given due notice of his design. But, if this is merely an error of inadvertence, it leaves a fine opportunity for improvement in the next edition of the book.

The cut representing the appearance of the fundus of an astigmatic eye, as seen by the direct method of examination, is worthy of especial note as the first attempt, among many, that has been at all successful in representing the appearance in question.

The student can, however, get a still better conception of this appearance, by following the suggestion of the author, to view an ordinary plate of the normal fundus through a cylindrical lens. The chapter on irregular astigmatism and conical cornea is particularly good, though it scarcely does justice to skiascopy, as the shadow-test is called, as a means of diagnosis.

In an appendix is given a statistical record of 806 astigmatic eyes belonging to 475 different individuals. In thirty-six per cent. of these the lens selected gave vision up to the normal standard. Not a very high percentage of good vision; but much better than the ten per cent. stated in the text as the proportion attaining this standard, this smaller proportion being based on the statistics of others. Dr. Burnett's statistics would be of more value if they represented in all cases the absolute refraction of the eye, as determined under a mydriatic. But from his expressed views as to the advisability of using mydriatics to determine the refraction, it is fair to infer that, in a considerable proportion of cases, only the manifest astigmatism has been ascertained; and this inference becomes certainty when we see that fifty-seven per cent. of the cases are set down as myopic astigmatism.

E. J.



LEHRBUCH DER ALLGEMEINEN UND SPECIELLEN PATHOLOGISCHEN ANATOMIE. By ERNST ZIEGLER, Prof. der Pathologischen Anatomie und der Allgemeinen Pathologie an der Universität Tübingen. Fünfte Auflage. Bd. ii., 8vo. pp. 499, 1020. Jena: Gustav Fischer, 1887.

A TEXT-BOOK OF PATHOLOGICAL ANATOMY AND PATHOGENESIS. By ERNST ZIEGLER. Translated and Edited for English students by DONALD MACALISTER, M.A., M.D. Part II. Special Pathological Anatomy. Sections ix.-xii., 8vo. pp. 391. London and New York: MacMillan & Co., 1886.

THE great popularity in Germany of Ziegler's *General and Special Pathological Anatomy*, is attested by its having passed through five editions in six years. It is not difficult to account for this popularity. The work covers all the subjects of both general and special pathological anatomy; it is profusely illustrated with admirable drawings; the style is clear and concise; the arrangement of the text is perspicuous and well adapted for the use of students; the abundant use of different sizes of type forces upon the attention the points intended to be emphasized; the subject matter is a vivid presentation of the author's views based largely upon his own researches and is not a mere reproduction of all current doctrines in pathology; and the book is kept fully abreast of the most recent advances in pathological science.

The book has been much improved in the fifth edition by many additions and alterations, by changes in arrangement and by the insertion of new drawings, which now number 703. The changes are greatest in the first volume which treats of general pathological anatomy.

The numerous drawings of microscopical specimens, many of them colored, were made by the author and are excellent. It is especially to be commended that those made with low magnifying powers predominate. Less praise can be given to the drawings of macroscopic specimens, of which a large number of new ones have been added to the present edition. These are of very unequal merit, and some are positively bad, such as the drawing of the pearl disease of cattle (Fig. 309, Vol. II.), of which the gross appearances are very characteristic. Nevertheless, the employment of a larger number of macroscopical drawings greatly enhances the value of the work.

By the introduction of a section on the Pathological Anatomy of the Eye, by Haab, and one on the Pathological Anatomy of the Ear, by Wagenhäuser, the work is made to embrace all departments of pathological anatomy. It can not be said, however, that the amount of space given to the various subjects is altogether commensurate with their importance. While, for instance, six pages are devoted to speculations concerning the inheritance of acquired conditions (essentially the views of Weismann being adopted), the diseases of the nose are dismissed in scant three pages, and a short paragraph suffices for neuroparalytic keratitis, a subject of much interest from the standpoint of both general and special pathology. How interesting and important is the pathological anatomy of the nasal cavity, may be learned by a perusal of the sixteen pages on this subject in Orth's recent work on *Special Pathological Anatomy*. It would have added to ease of reference and to the completeness of the book to have brought together in a compendious form the lesions of some of the more important infectious diseases, and those following

various organic and inorganic poisons, as has been done in Birch-Hirschfeld's text-book of *Pathological Anatomy*.

Ziegler's text-book is characterized especially by the prominence given to histological details, particularly to the finer cellular changes, such as those occurring in the processes of hyperplasia, regeneration, and inflammation. We miss the clear, full, and accurate descriptions of gross pathological appearances, such as distinguish Förster's classical *Handbuch der Pathologischen Anatomie*, as a new edition of which Ziegler's text-book was originally intended. Nor in respect to the happy combination of gross anatomical and of histological descriptions does Ziegler's work compare favorably with Orth's *Lehrbuch der Speciellen Pathologischen Anatomie*, of which the first volume has recently appeared.

The rearrangement in this edition of the chapters in the first volume is a decided improvement, although we can not understand why the subject of embolism should be placed in a chapter entitled "General Considerations Concerning the Etiology and the Genesis of Diseases." It is somewhat significant that the chapter treating of "Malformations" should immediately follow that devoted to "Tumors," as indicating that these morbid conditions are perhaps akin, although Ziegler does not accept in its entirety Cohnheim's hypothesis concerning the origin of tumors.

In his interesting treatment of the subject of "Regeneration," as well as in other parts of the book, Ziegler shows the important rôle played by karyokinesis in pathological processes. Cohnheim's doctrine of inflammation is accepted in its essential features. The only origin of pus cells admitted by Ziegler is the emigration of white blood corpuscles. Cells intended for the formation of new tissue are derived partly by proliferation from the fixed cells and partly from leucocytes, but of the latter only certain kinds, particularly the uninuclear ones, are capable of formative activity.

It is especially characteristic of the recent direction of pathological studies that no less than 118 pages of the new edition are devoted to the description of bacteria, in contrast to 60 pages allotted to this subject in the fourth edition published less than two years previously. In the preparation of the section on bacteriology the author acknowledges his indebtedness to the new edition of Flügge's *Mikroorganismen*.

The pathological anatomy of the brain and that of the spinal cord and of their meninges are considered together. This arrangement saves repetition, but it is often confusing and is less satisfactory than to describe the lesions of each organ separately. Ziegler attempts to clear up some of the confusion which has been introduced into this department of pathological anatomy by clinicians. Especially praiseworthy is his separation from myelitis of various atrophic and degenerative processes which have been erroneously placed in this category by clinical writers.

The chapter on the pathological anatomy of the lungs, although in many respects good, will commend itself less favorably to pathologists than the admirable treatment of the same subject by Orth in the work already mentioned. Ziegler regards the micrococcus Pasteuri of Sternberg (whose name is nowhere mentioned in the book in connection with this organism), as the cause of most cases of croupous pneumonia, although the bacillus pneumoniae of Friedländer and the streptococcus pyogenes may be occasional causes. Fibrous induration is described as a not infrequent termination of croupous pneumonia, without any consideration of the arguments of Wagner and others that these cases of dif-

fuse interstitial inflammation differ from the ordinary cases of croupous pneumonia. The statement that miliary tubercles of the lungs always begin in the pulmonary parenchyma (connective tissue and inter-alveolar septa) and the accompanying illustration (p. 680) are in opposition to the convincing researches of Arnold and of Baumgarten on this point. Much described and pictured as broncho-pneumonia in the chapter on pulmonary tuberculosis would be much better designated tubercle.

The ordinary classification of Bright's diseases into acute nephritis, chronic parenchymatous nephritis, and chronic indurative nephritis or contracted kidney is adopted. The frequency is ignored of patches of atrophy and of increased interstitial tissue in the kidneys grouped under the heading of chronic parenchymatous nephritis, a designation which is rendered of doubtful propriety by the existence of these changes.

Ziegler was wise in selecting an ophthalmologist to contribute the "Pathological Anatomy of the Eye," for this subject can not be treated satisfactorily by one not familiar with ophthalmoscopical appearances. Haab has presented in a brief but satisfactory manner a department of pathological anatomy of great interest and one too much neglected by professional pathologists. The pathological anatomy of the ear is treated too aphoristically to afford more than a bird's-eye view of the subject.

In view of its many external and not a few internal merits, Ziegler's *Pathological Anatomy* cannot fail to prove attractive to medical students, as has already been demonstrated; with teachers and investigators in pathology it is not likely to occupy so high a rank as some of its predecessors and competitors.

English readers are to be congratulated upon the completion of Dr. MacAlister's translation of Ziegler's text-book, of which the first two volumes have already been reviewed in this journal, and the volume containing sections ix. to xii. has since been published. The sections treating of the pathological anatomy of the eye, ear, bones, muscles, and genital organs have not been translated, on the ground that these subjects pertain to surgical pathology. In the translation of the concluding volume advantage was taken of the improvements in the fourth German edition.

W. H. W.

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ABDOMINAL SURGERY. By J. GREIG SMITH, M.A., F.R.S.E., Surgeon to the British Royal Infirmary; Late Examiner in Surgery, University of Aberdeen; Fellow of the Royal Medical and Chirurgical Society, London, etc. 8vo. pp. 600. Philadelphia: P. Blakiston, Son & Co., 1887.

THIS volume will supply a much desired want, not only to the practical gynecologist, but also to the general medical reader, who may wish to inform himself as to the progress of abdominal surgery. Written in a simple, clear, and condensed style, and covering almost the entire range of abdominal operations, the work has already attracted the attention of many American readers, who appear inclined to regard it favorably, although coming from the pen of a young man, as yet little known on this side of the Atlantic. Although very creditable to its composer,



we feel in our criticism inclined to draw attention to certain minor points, which ought to be corrected in a second edition.

Silkworm gut has not in this country stood the test of experience as a suture material for the abdominal wound. When carefully prepared and shot-clamped, it will occasionally produce "stitch-hole abscesses" which are at times long in closing, and for this reason some operators have abandoned it for the silver wire. Certain snoods appear to be infected, either by reason of impurities received in their preparation, or it may be, by disease in the silkworm itself, and the most careful asepsis will at times be disappointing. Where a drainage-tube is used, a long unsecured suture should be inserted opposite the centre of the tube, to be twisted or shotted after its removal.

The author remarks with reference to Mr. Lawson Tait's first oöphorectomy (August 1, 1872): "By some mistake, Battey records this case as being fatal" (page 147). Dr. Battey, in *The Medical News* of July 24, 1886, page 110, says, "this is another slip of the pen: at no time have I said that this patient died."

"Though Thomas and others claim to have diagnosticated the condition (extrauterine pregnancy) before rupture, it is unfortunately the case that the first sign of it usually appears at rupture" (page 159). American gynecologists are particularly sensitive upon the subject of their ability to recognize an early Fallopian pregnancy by the history, sensations, and touch. One of the fœtuses destroyed under the galvanic current by Prof. T. G. Thomas, has proved the correctness of his diagnosis, by escaping from the rectum. Twice have we seen early fœtal cysts exsected in this city, before rupture, after a careful diagnosis. The words "claim to" should be omitted.

"One operator has had recourse to the doubtful expedient of making space by turning the bowels outside the abdomen altogether" (page 169). This is quite a common practice with the best American operators, in cases where working space is wanted, care being taken to cover the intestines within a warm, prepared cloth, and to keep them warm until returned. We have seen this done repeatedly, and no ill effect follow.

*The Improved Cæsarean.* "A sufficient number of cases has not yet been recorded to enable us finally to judge of the risks of this operation" (page 259). Possibly the author may not be aware that 55 operations have been reported, with 39 women saved, and 50 children delivered alive. Last year (1886) there were 22 cases, with 4 deaths. These figures promise well.

In laparo-elytrotomy the bladder has been lacerated in one-half of the cases (6), instead of one-third (4), as stated on page 261.

"The results so far," in primary laparotomy for extrauterine pregnancy, "have been 17 operations with 15 deaths" (page 284). We will increase the first figure to 26, and give the fœtal loss as 14.

Mr. Holmes did not (Feb. 21, 1885) first supply to English readers, as stated on page 335, an account of Prof. Pietro Loreta's operation of digital divulsion of the pylorus, unless the word "English" be intended in a national sense. Prof. Loreta read the first account of his operation on Feb. 11, 1883, and on April 21, 1883, a full statement, with a record of four cases, was published by the reviewer, under a request from Bologna, in *The Medical News*, pp. 434-438. Prof. Loreta has of later years made his abdominal incision in the *linea alba*, whether for pyloric or cardiac stenosis. These operations must always be limited

mainly to Italy, for the reason that the conditions calling for them are much more common there than in the rest of Europe.

The illustration of the Czerny intestinal suture on page 412 is incorrect, as it is to be passed through the mucous membrane. This error is not to be wondered at, as it is found also in Treves, on *Intestinal Obstruction*, 1884, p. 485, and in Säger's "Der Kaiserschnitt bei Uterus-fibromen," 1882. The Czerny-Lembert suture will be found described in *The Medical News* of May 21, 1887, p. 588.

Dr. E. Hahn, of Berlin (April, 1881), was not the first to perform the operation of *nephrorrhaphy*, as stated on page 457, as this was done in Mobile, Alabama, prior to 1870. The kidney broke loose from its anchorage, and was removed by Dr. John T. Gilmore, in December, 1870, who found a cicatrix in the organ, two inches long, where the tape had cut its way out. The nephrectomy was entirely successful. Dr. Gilmore failed to give the name of the operator who preceded him in the case.

We are glad not to have found any errors of vital moment in Mr. Smith's creditable work, which bears the evidence of an extensive and painstaking research in the literature of America and the chief countries of Europe. It will, no doubt, be very extensively read in this country, and is of special value for its teaching in diagnosis.

R. P. H.

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY, FOR THE YEAR 1886. Vol. II. 8vo. pp. 516. New York: D. Appleton & Co., 1887.

THIS Society now consists of 58 active and 15 honorary Fellows. Its last annual meeting was held in Baltimore, on September 21, 22, and 23, 1886, at which there were present 29 Fellows.

As our allotted space will not admit of a *résumé* of the papers read, we will confine our remarks to a few of the more striking. Dr. Henry P. C. Wilson excited the attention of the Fellows, and provoked a prolonged and chiefly adverse discussion, by reading a paper in which he advocated the old plan of incising the posterior lip of the cervix uteri, "in some forms of antelexion of the uterus, with dysmenorrhœa and sterility," based upon an experience of over four hundred cases in eighteen years.

Dr. Ellwood Wilson, of Philadelphia, recommended an application of nitrate of silver in strong solution, one drachm to the ounce, at intervals of five days, several times repeated, as a means of healing recent lacerations of the cervix uteri, and gave an account of six cases thus satisfactorily treated, thereby avoiding a resort to trachelorrhaphy.

Dr. John Goodman, of Louisville, read a paper in condemnation of the use of ergot, at the close of the third stage of labor, based upon the results in two cases, one ending fatally, in which he had administered it. His opinion gave rise to a long discussion, in which the weight of testimony was in favor of the use of the drug in moderate doses.

The paper of Dr. Fordyce Barker, on "The Influence of Maternal Impressions on the Fœtus," was listened to with much attention and discussed at great length. The subject is one of the curiosities of ob-

stetrics and embryology, and much was brought forward that would appear to make it possible for a maternal impression to show itself in the foetus, after the period when embryology teaches us that the growth of the body, arms, and legs has advanced to their completeness of development. Coincidences are often very singular and difficult to explain, and so the *post hoc propter hoc* argument is resorted to. We confess to being rather sceptical upon this subject, except as to the effect of impressions experienced in the early formative stage of the embryo.

Dr. John Byrne, of Brooklyn, gave his experience in the use of the galvano-cautery in the treatment of procidentia uteri, in which he appears to have met with very marked success. In one case he amputated the cervix close up to the insertion of the vagina; in a second, he burned a gutter around the cervix with a platinum knife, and then partially amputated the cervix at the bottom of the groove by a platinum loop heated moderately; and in three other cases, in addition to the partial amputation, the vagina was grooved by the cautery knife, making three diverging fissures, one central, one toward either side on the anterior, and one only on the rectal surface, for a distance of about three inches, and through the hypertrophied vaginal membrane.

The long paper of the volume is that of Dr. George J. Engelmann, of St. Louis, entitled "The Use of Electricity in Gynecological Practice," which covers 149 pages. This is followed by one of 12 pages on "Electrolysis in Gynecological Surgery," by Dr. William H. Baker, of Boston, based upon the treatment by galvanopuncture of 14 cases of uterine fibroids. Dr. Baker advocates puncturing at intervals of one, two, or three months. In one of his cases the tumor entirely disappeared; in twelve it diminished from one-third to a half; and in the remaining case there was little or no effect. He also reported the successful treatment by the same method, of a case of perimetritic effusion, after failure in obtaining relief under the ordinary treatment recommended in such cases.

"Persistent Pain after Abdominal Section," is the title of a paper by Dr. James B. Hunter, of New York. This is a subject of much interest, but the cause is sometimes unaccountable. Operations for the relief of pain fail, and in some cases a cure follows a long period of suffering. The ligature has no doubt much to do with the production of pain in some sensitive subjects.

Dr. James R. Chadwick, of Boston, demonstrated the value of the bluish color of the vaginal entrance as evidence of pregnancy, shown by his examination of 281 pregnant women. The color was absent in 31, and doubtful in 28 cases; in 42 it was characteristic, and a general deep tint existed in 102.

Dr. W. H. Parish, of Philadelphia, reported a Cæsarean operation, and made a statement in reference to the growing mortality under this method of delivery, and the reasons for it, in the United States.

The unusual number of seven papers were contributed to the volume by candidates for admission to fellowship. We are glad to see this increase in the Society, and the introduction of new, young, and active workers to take the places of those recently lost by death and resignation.

R. P. H.



DER AUGENSPIEGEL UND DIE OPHTHALMOSKOPISCHE DIAGNOSTIK. Von Dr. F. DIMMER, Docent in d. Wiener Universität, etc. Pp. 175, with 73 illustrations. Leipzig und Wien, 1887.

THE OPHTHALMOSCOPE AND OPHTHALMOSCOPIC DIAGNOSIS. By Dr. F. DIMMER.

WE confess to great disappointment in this book. When a teacher in the great Vienna school, of many years' experience, writes a treatise we have a right to expect some actual contribution to our knowledge. We do not look for a rehash of what has been written ever so many times before and often better, and yet this is what a Docent in the University of Vienna and an assistant of the great Arlt offers us.

The only things which could, even by courtesy, be called new, are the description of Schmidt-Rimpler's method of determining refraction by the indirect method of ophthalmoscopic examination, and a good description of skiascopy, or retinoscopy, as he calls it, both of which could be obtained equally well from other sources at the command of the student. In the descriptions of changes in the fundus, constant references are made to the atlases of Jäger and Liebreich, the possession of which is necessary for the understanding of the text. A most natural and pertinent question is, If the reader has the atlases with the descriptions of the authors, what need has he for Dr. Dimmer's descriptions?

S. M. B.

HYSTÉRIE ET TRAUMATISM. Par le Dr. PAUL BERBEZ. 8vo. pp. 127. Paris: A. Delahaye et Lecrosnier, 1887.

HYSTERIA AND TRAUMATISM. By Dr. PAUL BERBEZ.

THE surgical aspects of hysteria, under which title the author includes paralysis, contractures, and joint affections of hysterical nature developing after injuries, have recently been studied by Charcot, and this little brochure by one of his pupils contains an interesting review of the subject. It covers a portion of the ground included in Page's work on railroad injuries.

The author finds the real cause of all hystero-traumatic phenomena in the special mental condition preceding the injury, and thinks that the injury itself has little to do with the special form of disease developed, since in many cases no evidence of trauma is found and the result is out of all proportion to the severity of the injury. Age, sex, occupation, race, and temperament have nothing to do with the etiology, but emotional excitement, especially fear, is a potent factor in the production of these effects.

Monoplegia is the form of paralysis most frequently seen; it is remarkable for its completeness, and the limb is perfectly helpless and flaccid; the tendon reflexes are preserved or diminished, never lost; the loss of motion is accompanied by a total loss of sensation and of the muscular sense; to the latter symptom the author attaches much importance in diagnosis. Paraplegia may occur and paralysis of a part of one limb

is occasionally seen; in the latter case it is one segment of the limb which is affected and not the muscles in the distribution of one nerve, as in true traumatic cases. In all cases the electric excitability of the muscles is preserved; their mechanical excitability is increased, but not infrequently a slight atrophy occurs; the temperature of the limb may fall, it may become cyanotic and the nutrition of the skin may be changed, but bedsores do not form. Paraplegia also occurs. Paralysis with contracture is the second form considered with its attendant deformities. In this condition voluntary motions are very limited and are unable to diminish the contractures or to affect the deformity; there is often an increase of the reflexes, and general sensibility is abolished except over certain irregular zones which are not uniform. Desquamation of the skin is often seen, and a progressive atrophy of the muscles without change in electric excitability is noticed.

When paralysis with contracture is associated with pain in the joint the condition is termed arthralgia, and this resembles so closely organic lesions of the joint that diagnosis is often difficult. The pain continues during rest, it is increased by motion, its distribution is the same as in real joint disease, the attitude and deformity are identical with those in joint disease, and the only differential sign of value is the existence of hyperæsthesia of the skin around the joint and on the limb. But under either all the signs of joint disease disappear, and hence, anæsthetics offer the chief aid to diagnosis.

The author cites a large number of cases in illustration of these conditions. An interesting fact discovered by Charcot is that all these forms of disease can be produced by suggestion in hypnotized persons, a fact which seems to him to prove that the mental state and not any physical condition is the underlying cause of all such affections. The conditions produced by suggestion may include abolition of motor power, with preservation or exaggeration of the tendon reflexes, and persistence of the electrical excitability, and also total loss of sensations of touch, temperature, pain, and of the muscular sense. Such a condition has no tendency to recover spontaneously and it is only by counter-suggestion in the hypnotized state that it can be removed. The character of the paralyzes and contractures thus produced is identical with that of those occurring after injuries in hysterical patients. It is, therefore, evident that the latter have a psychical origin. In the hypnotized state the brain is in a semisomnolent condition; attention, consciousness, judgment, and will are weak; memory, imagination, and emotion are active. The brain then acts only from incoming sensations or suggestions with little or no control. Tell the person hypnotized that he cannot move his arm, and the idea of powerlessness takes possession of his mind and neutralizes all the ideas of movement which former experience has given him. The same is true of the person injured, except that it is the injury which acts as the cause of the idea of weakness.

It is evident that explanations such as this may be probable, but are hypothetical, and that all attempts of the kind are unsatisfactory. The facts, however, are of interest. Nor is it any better to assign as a cause of contracture a "*diathèse de contracture*" or a "special excitability of the spinal cord." It is, perhaps, fortunate that the various phenomena of hysteria are being so carefully studied by the French school, but we cannot but think that M. Berbez, like many of his *confrères*, is unable to give a theory to account for the facts which will resist criticism. In

regard to treatment of these cases, it is evident that it must be directed to the mental state. It is possible to act on this, however, by physical means, and hydrotherapy and electricity, with massage, are the measures considered by the author as of greatest service.

M. A. S.

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THE TOPOGRAPHICAL ANATOMY OF THE CHILD. By JOHNSON SYMINGTON, M.D., F.R.S.E., Lecturer on Anatomy, School of Medicine, Edinburgh. Edinburgh, 1887.

THIS magnificent work forms one of the most important and most valuable of the recent contributions to human anatomy. Topographical anatomy is usually considered independently of the age and sex of the subject, and there can be no question that many of its data require reconsideration.

The present work is founded upon the examination of a series of frozen sections of the bodies of children. It is illustrated by fourteen life-sized colored plates, and by a number of woodcuts. Of the excellence and fidelity of the plates it is impossible to speak too highly. They reflect the greatest credit upon the publishers.

The vertical medial sections and some coronal sections of the thorax are the most valuable. Sections are given of all parts of the trunk; of the skull, to show the orbits and nasal fossæ; of the neck, to show the position of the larynx; of the thorax, abdomen, and pelvis.

The first part of the work is devoted to a critical explanation of the plates. The second part deals systematically with the more conspicuous results of the author's investigations. The topographical anatomy of the auditory meatus and tympanum, the condition of the spinal curve in children, the topography of the brain, and the relational anatomy of the male and female genital organs, are all dealt with in an able and original manner.

Dr. Symington's book abounds in original material. It is a work that no anatomist can afford to overlook. It adds materially to our knowledge of the most practical branch of anatomy, and is a credit to modern scientific research.

F. T.

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A PRACTICAL TREATISE ON DISEASES OF THE EYE. By DR. EDOUARD MEYER, Prof à l'École pratique de la Faculté de Médecine de Paris, etc. Translated, with the assistance of the Author, by FREELAND FERGUS, M.D., Ophthalmic Surgeon, Glasgow Royal Infirmary, etc. 8vo., pp. 650. Philadelphia: P. Blakiston, Son & Co., 1887.

In his brief preface the author tells us this work was prepared for the press nearly fifteen years ago, and that portions of it had then already been published; but so thoroughly has this English edition been revised,



and so well has it been brought up to the present state of our knowledge, that this would not be suspected from a perusal of the work.

A somewhat elaborate classification of the diseases of the eye is embodied in the book, involving its division into chapters and articles, and the latter by headings, subheadings, sub-subheadings, and paragraphs; but the arrangement of the various parts is natural, and a good index gives the intelligent reader direct access to all parts of its store of information; fitting it to be the reference book of the practitioner who does not hold himself especially familiar with this branch of medical practice. And this function, of a work of reference for the general practitioner, is the one this book is particularly fitted to perform. In this direction it is eminently "a practical treatise." But for the student desirous of mastering the subject of refraction, or the use of the ophthalmoscope, the first essential steps in the preparation for ophthalmic practice, it would prove rather an unsatisfactory manual. For instance, while we are given cuts and descriptions of the binocular ophthalmoscope of Giraud-Teulon, the fixed ophthalmoscope of Liebreich, and the ophthalmoscope for two observers of Sichel, instruments that have served merely to demonstrate the ingenuity of their inventors, and to take up the pages of "systematic" treatises on ophthalmology for the last quarter of a century, not a single modern refraction ophthalmoscope is figured, or even mentioned; and the shadow-test gets but a brief, obscure, inaccurate allusion, under the name of *Skioskopia*. Color-blindness, too, receives but little attention.

An excellent feature of the work is the giving, before the consideration of the diseases of each part, of a clear, succinct account of such points in its anatomy as bear directly on the pathology, diagnosis, or treatment of those diseases. A case of this kind, where diagnosis and therapeutics will be fixed by a knowledge of anatomy, is presented in hyperæmia involving the white of the eye. Here, when the injection is most pronounced back from the cornea near the fold of the conjunctiva, as it passes from the eyeball on to the lids, and the enlarged vessels form an irregular network freely movable over the deeper sclerotic, the trouble is conjunctival. But when the pink coloration is deepest and most distinct at the margin of the cornea, where the individual vessels are scarcely visible, while from this marginal zone, straighter, less movable vessels radiate backward toward the retrotarsal fold, the centre of disease involves the cornea, iris, or ciliary body; and the case is much more serious, and demands different treatment. Dr. Meyer brings out this point in diagnosis, and illustrates it very well by a diagrammatic representation of the two kinds of hyperæmia, both separately and coexistent.

We note in passing that our author is a believer in *amblyopia ex anopsia*, and even attempts to trace its disastrous progress.

The translator has done his part carefully and well. The colored plates are selections from Liebreich's *Atlas of Ophthalmoscopy*, and are well executed, as are also the woodcuts, and, indeed, the printing throughout.

E. J.

# QUARTERLY SUMMARY

OF THE

## PROGRESS OF MEDICAL SCIENCE.

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### ANATOMY.

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UNDER THE CHARGE OF  
GEORGE D. THANE, M.R.C.S. ENG.,  
PROFESSOR OF ANATOMY AT UNIVERSITY COLLEGE, LONDON.

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#### ON THE SYNOVIAL SHEATH OF THE RADIAL EXTENSORS OF THE WRIST.

In the *Revue de Chirurgie* for 1882, LARGER described a second synovial sheath to the radial extensor tendons, surrounding them where they are crossed above the wrist by the thumb-muscles. DEBIERRE and ROCHET state (*Archives de Physiologie* for February, 1887) that they did not find this sheath in any one of more than forty subjects examined; but in all cases there was a small bursa, which Larger refers to as accidental, between the tendons of the radial extensors and the extensor ossis metacarpi and primi internodii pollicis. This bursa is the ordinary seat of painful ganglion in this region. The synovial sheath of the radial extensors beneath the annular ligament is usually single, but occasionally double. It always communicates with the sheath around the extensor secundi internodii pollicis, the aperture being placed over the tendon of the extensor carpi radialis brevior, and leading into the inner division only of a double sheath.

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#### ON THE NERVOUS SUPPLY OF THE LUMBRICALES.

H. ST. JOHN BROOKS shows that the nervous supply of the lumbricales in the hand is subject to frequent variations, and that the current statements with regard to the nerves of these muscles in the foot are incorrect. In the hand, the prevalent condition is for the median nerve to supply the first and second, and the deep part of the ulnar the third and fourth; but in many cases the third lumbrical has a branch from the median as well as one from the ulnar. More rarely the second has also a double supply; or, on the other hand, the median supplies wholly the first, second, and third, and the ulnar the fourth only. Ten feet were examined, and in nine of these only the first lumbrical was supplied by the internal plantar, the rest deriving their nerves from the deep part of the external plantar. In the tenth case the first and

second muscles received twigs from both plantar nerves; the third and fourth from the external alone. The author believes that originally all the lumbricals were supplied on their superficial surface, and that the deep nerve is gradually displacing the superficial, thus illustrating Cunningham's proposition that in mammals the ulnar and external plantar nerves are encroaching upon the territory of the median and internal plantar respectively. There is an evident general correspondence between the innervation of a particular belly of the flexor profundus and of the corresponding lumbrical: the individual belly and the first lumbrical are supplied exclusively by the median; the fourth belly and fourth lumbrical are supplied typically by the ulnar only; and the third belly and lumbrical have usually a double supply; but while the same is the case with the second belly, it is very exceptional in the second lumbrical (*Journal of Anatomy and Physiology*, July, 1887).

#### ON THE PHARYNGEAL ORIFICE OF THE EUSTACHIAN TUBE.

CASIMIR VON KOSTANECKI deals with the cartilaginous and membranous portion of the Eustachian tube in a long article, illustrated by twenty-four figures showing different forms of its pharyngeal ending. The paper consists of detailed descriptions, and cannot, therefore, be satisfactorily abstracted; but the chief general points are as follows:

The position of the pharyngeal orifice is not the same at different periods of life, and is subject to many individual variations. It often differs somewhat on the two sides in the same person. The distance from the anterior nasal spine varies from 5.3 to 7.5 cm. Vertically, its most frequent position is behind the inferior concha, at an average distance of 10 mm. above the hard palate; but it is sometimes behind the middle, at others behind the inferior meatus. In the fœtus the orifice is below the hard palate; at birth on the same level. From the roof of the pharynx the average distance is 11 to 12 mm.; the extremes 9.5 to 15 mm. From the hinder wall of the pharynx, 10 to 19 mm.; average, 12 mm. From the inferior concha, 4 to 14.5 mm.; in children under one year, 7.5 to 10.5 mm.

The typical form of the opening is that of a triangle, the upper angle of which is rounded off slightly, while the base below is convex upward, owing to the projection of the belly of the levator palati toward the lumen. The two lower angles are thus prolonged as grooves along the floor of the tube and the upper surface of the soft palate—*sulcus salpingo-palatinus*, anterior and posterior.

The anterior or outer lip of the orifice is frequently indistinguishable, the outer wall of the tube being continued directly into the side wall of the nose; but in the great majority of cases it is marked by a distinct fold—*plica salpingo-palatina*, determined by a fibrous band, the *ligamentum salpingo-palatinum anticum*.

The opening of the tube is affected by the tensor palati, levator palati, and salpingo-pharyngeus. The contraction of the levator raises the floor of the tube, and so reduces the vertical diameter of the orifice, but at the same time it pushes upward the inner plate of the cartilage, thus making the lumen wider.

The recess of Rosenmüller, or *sinus faucium lateralis*, varies in depth from



0 to 17 mm., and is continued downward by a groove which is named *sulcus pharyngo-oralis lateralis*. In addition to the foregoing, the *sinus faucium superior* of Tortuall is recognized, a small depression above the prominent end of the tube (*Archiv für mikroskopische Anatomie*, June, 1887).

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## MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

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UNDER THE CHARGE OF

ROBERTS BARTHOLOW, M.D., LL.D.,

PROFESSOR OF MATERIA MEDICA, GENERAL THERAPEUTICS, AND HYGIENE IN  
THE JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

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### STENOCARPINE; A NEW AND POWERFUL ANÆSTHETIC AND ANALGESIC OF INDIGENOUS SOURCE.

The most remarkable discovery since Koller's demonstration of the analgesic power of cocaine, is that just made by MR. GOODMAN, a veterinary surgeon of Louisiana, and DR. ALLEN M. SEWARD, of Bergen's Point, New Jersey. Mr. Goodman ascertained, by the merest accident, that analgesic and anæsthetic properties were possessed by the leaves of a tree, known in the locality where it grows, as the "Tear Blanket Tree." Obviously, this designation is significant of the injury done by the sharp spines, with which the tree is plentifully garnished. It is greatly to Mr. Goodman's credit that he had the sagacity to observe and to reason from his facts. The leaves of the tree were submitted to Dr. Seward, who isolated an alkaloid, to which he gave the name *stenocarpine*.

The physiological actions of stenocarpine have been carefully studied by DR. CLAIBORNE and DR. KNAPP, both of New York. Their conclusions agree closely for the most part. A two per cent. solution, with which Dr. Claiborne was supplied, was employed by both investigators, Dr. Knapp having obtained a small quantity from his colleague. As the powers and properties of cocaine are so well known, a comparison of the new anæsthetic with its older cogener will develop their respective qualities the more fully, and by the contrast, when differences are found, more characteristically.

Stenocarpine acts as an analgesic and anæsthetic when applied in solution to the mucous membrane at any point. Dr. Claiborne asserts that it has the same influence on the sensibility of the skin; but Dr. Knapp did not find it so, although his negative result may be attributed to the small quantity of the alkaloid with which he operated. When a plentiful supply of the new alkaloid becomes available, this question can be easily and finally settled. Injected beneath the skin, an anæsthetic area is produced, having the limits which the extent of the diffusion determines, as is, also, the case with cocaine.

When applied to the conjunctiva the anæsthetic effect takes place in from five to ten minutes, and in from ten to fifteen minutes the pupil dilates and the accommodative apparatus becomes paretic and then paralyzed. As com-

pared with cocaine, the effects of stenocarpine on the pupil and on the accommodation are far greater. The dilatation of the pupil is nearly equal to that produced by atropine, but it is not as persistent. In certain cases the pupil of the other eye contracts to a mere pin's head in size. The anæsthetic and analgesic effects are quite equal to those of cocaine in corresponding strength.

Stenocarpine is more actively toxic than cocaine. It causes tetanic spasms not unlike those of strychnine (Knapp); but the tetanoid paroxysms are accompanied by trembling, weakness, and incoördination, and, finally, paralysis ensues—a fact that indicates exhaustion of the centres, at first stimulated. Very rapid action of the heart occurs, probably because stenocarpine paralyzes the pneumogastric, and thus removes the inhibition. As the effects deepen, paresis of the respiratory muscles comes on, and ultimately they become paralyzed, the action of the heart failing after respiration has ceased. Although additional observations are needed to settle the nature of the influence exerted on the respiration and circulation by stenocarpine, there is little doubt that the explanation above given will prove to be true.

Knapp's observations on the therapeutical applications of the new remedy, and the comparison between it and the actions of cocaine, are characteristically thorough, and have an enduring interest for all those practising ophthalmology. We have space here for the principal points only.

Whenever, with the actions of an anæsthetic, a mydriatic is required, as in iritis, stenocarpine is preferable to cocaine. It is also better than atropine when there is a tendency to glaucoma, and much pain is felt. When, however, an anæsthetic is necessary, and a mydriatic is not, then cocaine becomes more useful; and this condition of affairs includes all the ophthalmic surgical procedures. As stenocarpine is nearly as powerful as atropine in dilating the pupil, and as its influence continues only about half as long, it is preferable to atropine for this purpose.

It need hardly be explained that stenocarpine can be substituted for cocaine as a local anæsthetic in the numerous maladies for which a local anæsthetic is needed. If it shall be proven hereafter that in a sufficiently concentrated solution stenocarpine anæsthetizes the skin, as well as the mucous membrane, it will assume the first place as a local anæsthetic and analgesic.

It must be stated also that some subjects possess a remarkable susceptibility to the actions of stenocarpine. This fact is true also of cocaine. In a few instances, when stenocarpine has been instilled into the eyes, weakness, faintness, a cold sweat, and a rapid but feeble action of the heart have ensued, as it is so powerful. Knapp utters a caution, and advises that it be not injected into very vascular tissues.

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#### SOLANIN.

The active principle *solanin*, although long known as a constituent of the potato in its fresh state, has received but little attention. Last year, however, DR. GENEUIL published a paper (*Bull. Gén. de Thérap.* for September, 1886) in which he ascribed very valuable anodyne and hypnotic qualities to solanin. To confirm or refute the conclusions arrived at by Dr. Geneuil, an elaborate investigation was made by Dr. Gaignard in the laboratory of the Hôpital Cochin under the direction of Dujardin-Beaumetz. We have the result now

in a paper which appears in the current issue of the *Bull. Gén. de Thérap.* of July 15th. Unfortunately, the conclusions are negative, chiefly.

Dr. Gagnard says that solanin is a glucoside, which does not combine with acids to form salts.

It is absolutely insoluble in simple water, and soluble only in strongly acidulated water.

It is highly irritating to the tissues.

It is uncertain in action, and only massive doses will produce an analgesic effect. At its best, solanin is not a useful analgesic. Moreover, it is an expensive remedy, and relatively large doses are required to produce an effect. The ordinary dose is from one to three grains, and the daily amount ranges from four to eight grains.

Solanin, it is clear, cannot be regarded as useful in itself, or as a substitute for another remedy.

#### EFFECTS OF HYOSCINE.

ROBERT, in a recent number of the *Archiv f. experiment. Pathol. u. Pharmacol.*, vol. xxii., narrates his experiences with hyoscine. There are two sources of this alkaloid: From the mother liquor out of which the alkaloid hyoscyamine has crystallized, and synthetically by the process of Ladenburg. The latter source is a mere matter of scientific interest. The hyoscine of the first source is an amorphous, resin-like substance, but it has all the activity of a crystallizable alkaloid. It is isomeric with atropine and hyoscyamine, and it acts like the former on the vagus, and on the heart of warm-blooded animals. It does not act on the vasomotor centre in the medulla, nor does it affect the pulse frequency. The salivary and the sweat-glands are acted on, and their secretions arrested. It paralyzes the motor-nerve apparatus of the intestine, when stimulated by muscarine.

Hyoscine acts more promptly and thoroughly on the pupil than atropine does, but the mydriatic effect is much shorter in duration. On the brain of healthy persons it has a weak narcotic property. In morbid states of the brain hyoscine is found to lessen excitement, and to bring about sleep in ten to fifteen minutes, and its hypnotic action may prove successful when chloral, the bromides, paraldehyde, and urethan have failed. It is, therefore, highly useful to calm the excitement in cases of mania, but in somatic diseases with wakefulness it is of doubtful utility. Edlefsen and Illing prescribe it when the chief indications are furnished by spasmodic cough, asthma, epilepsy, etc.

In animals hyoscine is not at all actively toxic, and in man the indications afforded by dilatation of the pupil, incoördination of movements, dryness of the throat, etc., appear long in advance of any danger.

#### INJECTION FOR GONORRHOEA.

DELPECH proposes the following injection for the treatment of gonorrhœa:

R.—Hydrarg. ammoniat. peptonic. . . . . gr.  $\frac{1}{10}$ .  
 Aquæ destil. . . . . ʒvi.—M.

Directions for use: Take an injection morning and evening after passing urine. The first and second injection should be allowed to escape; the third one should be retained in the canal a minute or two. This procedure should be carried out twice each day—morning and evening.



## MASSOTHERAPY.

Under the newly coined title massotherapy DUJARDIN-BEAUMETZ discourses on massage (*Bull. Gén. de Thérapeutique*, July 15, 1887). He presents an interesting historical summary from Hippocrates down, showing how in this, as in so many other points of practice, our modern discoveries are only revivals of ancient usages. One of the most curious of the works referred to is that of Paullini, *Flagellum Salutis*, which, a century afterward, was republished by Meibomius (1795), under the French title which may be thus rendered: *The Utility of Flagellation in Medicine and the Pleasures of Marriage, and in the Functions of the Loins and Kidneys*. This title will recall the manner in which the Town Bull is stimulated to the performance of his public functions, as narrated in an English classic.

The physiological effects of massage are exerted on the functions of the skin, the muscular system, the circulation, the nervous system, absorption, and nutrition. As respects the skin, he refers to the mechanical displacement of the epidermic cells, and the opening of the orifices of the sebaceous and sudoriparous glands, the principal utility of the practice, which thus increases the circulation and functional activity of the cutaneous apparatus. The tone of the muscles, their contractile energy, their nutrition, are improved by the movements of which they are the subject. The increased activity of the circulation in the skin and muscles promotes oxidation and combustion, and hastens the removal of effete materials. The increase of the peripheral circulation reacts on the central apparatus, and hence there is greater activity with higher temperature of the whole body.

The effect of massage on the nervous system is twofold, consisting in pressure, friction, and elongation of nerve trunks, and in a peculiar mental state, called by Barety, whom our author quotes, *neurisation*. Now, Barety entitles his work *Animal Magnetism*, and ascribes a certain influence to "passes," thus reviving and bringing into the terms of science antiquated mesmeric jargon. If this is to be the outcome of massage, it were high time to call a halt.

On the pathological side, the usual effect of massage on local inflammatory deposits, effusions, etc., are duly set forth by Dujardin-Beaumetz.

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HYPNOTISM.

The jugglery of hypnotism, and its medico-legal relations, are the subject of a recent work by GILLES DE LA TOURETTE, to which an introduction has been written by Prof. Brouardel. A French critic has well said that this subject has become "an object of commerce, transportable and lucrative," and that the "commercial travellers of hypnotism" are doing infinitely more mischief than is supposed; so much so, that the Austrian and Italian governments have forbidden the exercise of their arts. It is not a hopeful indication that the methods and terms of Mesmer are again proposed as a remedial agency. It is a fact that under the leadership of Dr. Elliotson, of London, the mesmeric trance was utilized for the production of insensibility for surgical operations, and the announcement of anæsthesia by ether, just discovered in this country, was made in the *London Medical Gazette*, under the title "Animal Magnetism Superseded." But this occurred in 1848.

## IODIDE OF POTASSIUM IN THE BRONCHO-PNEUMONIA OF CHILDREN.

DR. ZINIS, of Athens, Greece, in a letter which appears in a recent issue of the *Bull. Gén. de Thérapeutique*, advocates the use of iodide of potassium in the broncho-pneumonia of children, making some reservations, however, as to the form of the disease. He asserts that a perfect cure of the disease is more certainly accomplished by this than by any other remedy, especially if used early. He finds that it lowers the temperature one to two degrees, that it sensibly diminishes the cough, and calms the respiration, and that it renders the expectoration easier. He makes the reservation that the broncho-pneumonia of measles and whooping-cough is not so amenable to the action of this remedy. He finds also that the results are better when the child is vigorous, and when the age is above rather than under five years. These are important exceptions, and very much limit the utility of the remedy. It is, however, no secret in this country that small and frequently repeated doses of the iodides are of great utility in cases of capillary bronchitis.

The quantity of the remedy recommended by Dr. Zinis to be given in twenty-four hours varies, according to the age, from eight grains to a scruple, dissolved in three ounces of water.

*Apropos* of the use of the iodides in the bronchitis of children, M. H. Roger advises the following:

R.—Syrupi amyli iodidi . . . . . ʒiv.  
Potassii iodidi . . . . . gr. xv.—M.

Before each meal a coffeespoonful of this syrup. Every morning  $\frac{1}{30}$  grain granule of arseniate of soda in a cup of milk; and at each meal two ounces of raw beef and half a drachm of phosphate of lime in powder.

## THE ACTIONS OF THE CRYSTALLIZABLE VERATRUM ALKALOIDS.

DR. HEINRICH LISSAUER publishes, in the last issue of the *Archiv für experimentelle Pathologie und Pharmacologie*, an elaborate research on the actions of the crystallizable veratrum alkaloids. We submit his conclusions:

These alkaloids paralyze the vasomotor apparatus, including the vasomotor centre in the medulla, and probably, also, directly the organic muscular fibre of the vessels.

They slow the action of the heart without enfeebling it, if the doses exhibited are not so large as to paralyze directly.

They affect the respiratory action, at first merely slowing and lengthening the interval, but at last complete paralysis ensues.

The movements of the peripheral muscles are affected in a similar manner.

The digestive tract is influenced variously in different animals: in some there is merely salivation; in others, nausea, vomiting, and diarrhœa.

By large doses, spasms centric in source are produced.

Temperature is affected, and without doubt in a secondary manner, through the action on the vascular apparatus and the function of assimilation.

We do not find that our author has contributed any new facts to the existing knowledge of the effects caused by the veratrum alkaloids.

## THE GERMAN AND FRENCH TREATMENT OF ASTHMA COMPARED.

DR. SCHLEMNER (*Revue de Thérapeutique*, June 15, 1887) makes a comparison between German and French therapeutical methods as applied to the treatment of asthma. As regards the reflex influences which determine attacks of asthma, especially morbid states of the nasal mucous membrane, they seem to receive more attention from German than French therapists.

In the treatment of the asthmatic paroxysm, both employ the inhalation of pyridine and the subcutaneous injection of morphine and cocaine. Lazarus, who has but little confidence in such remedies as paraldehyde, hyoscyamine, atropine, and quebracho, praises chloral and iodide of potassium. Whilst the French employ with success the rectal injections of sulphuretted hydrogen, there are no reports from Germany of similar experiences.

Besides the iodides and pyridine, some German authorities use, also, arsenic and lobelia. Brügelmann insists on the importance of pneumotherapy, especially when catarrh and emphysema complicate the case; Lazarus especially vaunts nitrogen and saline inhalations, and terpine; and Lublinsky advocates the treatment of the accompanying neurasthenia or constitutional states, and in this practice Boecker and other physicians coincide.

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ULEXINE.

GERRARD has recently separated an alkaloid from *Ulex europæus*, to which the name ulexine has been given. This new principle has been investigated by MR. J. ROSE BRADFORD, whose paper appears in the current issue of the *Journal of Physiology* for June, 1887, vol. viii. No. 2.

The hydrobromate is the salt used in these investigations. It was ascertained by experiments on frogs, that ulexine paralyzes muscles and nerve trunks, and depresses the spinal cord somewhat. In sufficient doses, it first arrests voluntary movements and the reflex actions, but the muscles continue to contract feebly on direct excitation, unless the dose be very large, when they too, are immediately poisoned. In cold-blooded animals—frogs and eels—ulexine paralyzes the vagus, and the heart is also slowed and weakened.

Ulexine acts on the respiration in a peculiar manner, and in a minute quantity, not sufficient to affect voluntary movements, causes paresis, irregularity, and slowness of respiration. In the words of our author—"with larger doses the respirations will be arrested some time before voluntary movement is paralyzed."

In mammals ulexine is a powerful respiratory poison also. Small doses caused fibrillar contractions of the muscles of a very persistent character, and at first the muscles respond with an abnormal readiness to mechanical irritation, but this stage of excitation is succeeded by paresis, and, finally, complete paralysis succeeds.

Ulexine increases the blood pressure very considerably and quickly if the amount given be small, but this rise is succeeded by a gradual fall. When a large quantity is given the rise in the blood pressure is inconsiderable, and the fall is greater and longer in duration. Mr. Bradford ascertained that there ensues a marked contraction of the kidney simultaneously with the rise in the blood pressure, and, hence, he concludes that this phenomenon is due to contraction of the arterioles.



When the vagus can no longer inhibit the heart's action, the pulsations become very rapid, but weak. The kidney contracting with the rise of pressure, it again expands with the fall. Ulexine is an active diuretic, and can best be compared with caffeine, but the latter has a more sustained influence. Our author concludes his paper with the following sentence, which is a compendious statement of the facts and a summary of his final opinions:

"Thus ulexine is an alkaloid, having a powerful and widespread action, being a nerve and muscle poison, a respiratory poison, raising arterial tension, and producing diuresis; but the respiratory action of the drug being produced by the smallest doses, seems to be the most important."

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#### GLYCERINE AND DIABETES.

In the last issue of *The Journal of Physiology* MR. W. B. RANSOM discusses the influence of glycerine on the sugar-producing function of the liver. Weiss and Luchsinger had before demonstrated that under the action of glycerine an accumulation of glycogen took place in the liver; and, subsequently, Luchsinger and Eckhard ascertained that experimental glycosuria was sometimes prevented by the subcutaneous injection of glycerine.

After a careful investigation of the subject by experimental work, Mr. Ransom has formulated the following conclusions:

- "1. That certain forms of glycosuria may be checked by glycerine.
- "2. That glycerine acts more efficiently when introduced into the alimentary canal than when injected subcutaneously.
- "3. That glycerine checks glycosuria by inhibiting the formation of sugar in the liver.
- "4. That in this way glycerine may lead, indirectly, to an accumulation of glycogen in the liver."

Mr. Ransom holds that the production of glycogen in the liver is due to cell metabolism and not to the action of a ferment. The action of glycerine, he thinks, consists in some modification in the protoplasm of the liver-cells. He has no opinion to express as to the therapeutical value of glycerine in diabetes, and the views of clinicians are both various and conflicting. It is quite probable, the reviewer thinks, that some change in the quantity given and in the manner of giving it will place glycerine amongst the most valuable of the remedies for diabetes.

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#### TREATMENT OF ANGINA PECTORIS.

In a recent issue of the *Revue de Thérapeutique*, we find a compendious statement of DR. HUCHARD's opinions on the subject of cardiac diseases remediable by the iodides. In his picturesque phrase, "these are maladies that have the heart for their seat, and the arteries for their origin." The treatment by the iodides is first concerned with relieving that condition of the vessels which prevents a proper interchange between the blood and the tissues; afterward with the muscular substance (*myocarditis*). Besides these, he includes a group in which, whilst the rational signs are significant, there are no physical signs of the mitral disease. The present conception of its clinical characteristics is indicated in the title—arterial cardiopathy—which is applied to a group including the coronary arteries, the muscular substance

of the heart, and the aorta. They have these clinical characteristics in common: as expressed in the language of Huchard—"they are latent in their evolution, insidious in their origin, paroxysmal in their course, accidental and intermittent in their manifestations, sudden and destructive in their explosions of arhythmic irregularity." The heart suffers secondarily to the alterations which begin in the arterial system. It follows necessarily that to confine the treatment to the heart is to fail. It is less a cardiac medication than an arterial to which our treatment should be addressed, and this conception is as applicable to the treatment of angina pectoris as to all other diseases included within the great morbid process called *arteriosclerosis*.

#### HYDROQUINONE.

DR. SILVESTRINI and DR. PICCHINI, his pupil, have published (*Il Morgagni* and *Revue de Thérapeutique*, July 15, 1887) some recent observations on hydroquinone. This chinoline derivative was brought forward three years ago as a substitute for quinine, and very sanguine expectations of its therapeutical utility were entertained. Its antipyretic power was not questioned, but it was soon perceived that certain unpleasant, even dangerous conditions were induced by it. Profound depression, severe rigors, profuse sweats, so often occurred when its antipyretic powers were utilized, that very soon it ceased to be employed, and the safer antipyretics as antipyrin, acetanilide, salol, etc., substituted.

Prof. Silvestrini and his pupil have, however, arrived at different conclusions from those heretofore held, and assert that it has an immense superiority over its congeners, in its perfect innocuousness in the strongest doses. It is prompt in action, and the higher the febrile temperature, the more powerful as an antipyretic. In typhoid, acute rheumatism, and erysipelas, it acts in a highly efficient manner; and besides abating the temperature of fever, it has the power to remove the attendant symptoms—the disturbances of pulse and of respiration, the elimination of urea, the blood pressure, etc.

Hydroquinone is not irritant, and any gastro-intestinal trouble present is not increased by it. Having the antiseptic and germicide powers belonging to the group, when introduced into the intestinal canal it arrests the process of fermentation by inhibiting the microbes necessary to the process.

The dose of hydroquinone ranges from five to thirty grains, the frequency of administration determining to some extent. It is freely soluble in water, and unirritating, and hence can be given hypodermatically.

#### MERCURIAL PARALYSIS.

An elaborate research, pathological and clinical, is being published, on the nature and site of mercurial paralysis, by M. MAURICE LETULLE in the *Archives de Physiologie, Normale et Pathologique* for 1887. This study is in continuation of the valuable observations of Küssmaul and those of Hallopeau, and is reinforced by the large field of clinical investigation furnished by the great quicksilver mines of Almaden.

In the study of mercurial trembling, a symptom that has always attracted much attention, our author finds that the muscles of the extremities are often feeble although trembling has not occurred, and that the muscular weakness

up to the period of paralysis is not accompanied by atrophic degeneration. The electrical reactions, when the paralysis is partial, remain normal. The tendon reflexes do not disappear, but they become feeble. Disorders of sensibility (dysæsthesia) accompany the other phenomena—of the upper extremity constantly, and in one-half, only, of the lower. In somewhat more than one-half the special senses were affected, and were bilateral. The pain experienced, was felt in the areas subsequently paralyzed.

Notwithstanding appetite and digestion remain unimpaired, loss of flesh goes on steadily; degenerative changes having many of the characteristics of senility occur; the teeth darken and become even black, their surface roughened and crossed by deep lines of erosion, and grow more and more carious.

As regards the pathological changes in the nervous system, our author finds that the distinctive characteristic is the action of mercury on the myeline; there is no change of an inflammatory kind, and the chemical alteration consists in a disintegration and disappearance of the fatty constituents of the nerve elements.

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#### METHYLAL.

Methyl alcohol is the source of the new local anæsthetic. It is neutral, volatile, has an ethereal odor, and a pungent taste. An investigation of methylal has recently been made by Motrochin, in the laboratory of PROF. ANREPS (*Vratch*, No. x., 1887, and *Bull. Gén. de Thérap.*, July 15, 1887). The study includes observations on animals and on man.

The inhalation of methylal vapor causes drowsiness and sleep, but when the inhalation is stopped, the sleep ends. During the time of its action, the sense of pain is abolished. Respiration is slowed somewhat, but also deepened, and there is no alteration of its rhythm. The heart remains unaffected.

The subcutaneous injection of methylal induces more or less anæsthesia, but it is short in duration. Reflex action is lessened, or it may be suspended entirely if a sufficient quantity is administered. The excitability of the psycho-motor centres is much diminished when the remedy is injected subcutaneously or inhaled, but this effect is transient. Methylal antagonizes to some extent the actions of strychnine and picrotoxin.

The inhalation, and stomachal administration, are by far better modes of giving it than by subcutaneous injection. It acts favorably on man, and in a moderate dose produces a decided anæsthesia, especially of the head and face, and more or less vertigo.

It is obvious from these facts that methylal has properties and powers very similar to those of paraldehyde, and may be prescribed in all morbid states to which the latter has been considered adapted.

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#### ACTION OF CALOMEL ON THE BILE.

DR. J. ZAWADZKY (*Vratch*, 1887, quoted by the *Bull. Gén. de Thérap.*, July 15, 1887) presents certain conclusions at which he has arrived after a long, faithful, and conscientious study of the subject, the influence of calomel on the decomposition of the bile.

He finds that calomel has the property to prevent the decomposition of bile after it has entered the duodenum. The characteristic calomel stools, he ex-



plains by the transformation of bilirubine into biliverdine in the presence of  $\text{Hg}_2\text{O}$  (corrosive sublimate) into which calomel is, in part at least, converted, after entering the intestine. From this point of view, then, the so-called calomel stools are not the result of a cholagogue action.

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#### CALOMEL AS A DIURETIC.

M. JENDRÁSSIK reports (*Deutsches Archiv für klin. Med.*, 1886) the results obtained from the combined action of calomel and jalap—from two to four grains, of each, three or four times a day. From the second to the fourth day the diuresis begins, and is very active, the amount of urine surpassing the diuretic action of digitalis. The quantity of urine voided increased for several days, and after the maximum, gradually lessens to the normal. By this time mercurial salivation has occurred to some extent, but less than if the jalap had not been given. It is asserted by Jendrassik that any purgative action lessens the diuretic.

In attempting to explain the action, he makes no mention of the resin of jalap, which is a stimulating diuretic of considerable power, nor does he refer to the reflex influence proceeding from the intestine.

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### MEDICINE.

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#### UNDER THE CHARGE OF

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#### THE VALUE OF SUDORAL ERUPTIONS AS A PROGNOSTIC SIGN IN TYPHOID.

LACAZE (*Revue de Médecine*, 1887, p. 270), after a definition of sudamina and miliaria, and numerous extracts from the literature of the subject, concludes that the sudaminal eruptions which appear before the commencement of the second week of typhoid fever have no value in determining the duration or the prognosis of the malady; while those coming after the second week, during the doubtful period, are almost always the sign of the commencement of full convalescence.

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#### ON A METHOD OF PROPHYLAXIS AND AN INVESTIGATION INTO THE NATURE OF THE CONTAGION OF SCARLET FEVER.

JAMIESON and EDINGTON (*British Medical Journal*, 1887, 1, 1262) publish a valuable article on this subject, accompanied by a colored plate. It is acknowledged that scarlet fever is but little communicable in its early stages, and that the exhalations from the mouth, and the flakes of skin, contain the

active contagium. Jamieson has previously expressed the view that it is probably a parasitic organism, and that when inhaled or swallowed, it finally, in the course of the disease, reaches the skin from the blood, and, ripening there, is ready for immediate multiplication in the body of some other individual. In accordance with this theory, he endeavored to prove by experiment that it is possible to prevent the spread of the disease even to persons in close contact with the patient. For this purpose he made frequent applications to the throat of a strong solution of borax in glycerine; while to disinfect the skin, warm baths were employed every night from the beginning, and a mixture of carbolic acid, 30 grains; thymol, 10 grains; vaseline, 1 drachm; simple ointment, 2 ounces, was rubbed over the entire body night and morning. In this way, he reasoned, the scales would never become contagious.

The experience of the last three years completely bears out the correctness of this opinion. He reports a series of cases going to prove that the treatment mentioned decidedly lessens the danger of the spread of the disease. He also quotes some cases to show that the late desquamation contains the contagium in the largest amount; indicating that air is necessary for its maturation, since it is then that the cuticle is more fully separated, dried, and oxygenated.

The following lines of investigation were now to be carried out:

1. To discover the organism on which the virulence of the epithelial flakes depends.
2. To ascertain at what period it first appears.
3. To determine whether the clinical methods employed as described for neutralizing the contagiousness of scarlet fever are actually capable of killing it.

This, the bacterial part of the investigation, was carried out by Edington. He details the very careful methods of research adopted, with the numerous precautions taken. He could find no microbes in the epithelial scales themselves, and it is probable that only spores are to be found here; but he describes and figures several species of bacilli and micrococci obtained in cultures from the blood and scales. Experiments show, however, that there is but one, the *bacillus scarlatinæ*, which seems to be truly pathogenic. This bacillus is  $4\ \mu$  in thickness, and  $1.2\ \mu$ – $1.4\ \mu$  in length; motile, and occurring in long, jointed filaments. On gelatine plates it forms points of liquefaction after several days. It rapidly liquefies Koch's jelly tubes, but with no distinct growth-formation, and develops a characteristic pellicle after the liquefaction is well advanced. In fluid broth it forms a coherent, parchment-like pellicle within four hours, which later exhibits a deep wrinkling, due to a dense network of bacillary filaments. It was found in every tube but one (this exception being a tube broken early in the experiment), if started after the end of the third week, but never before this time. It was also detected in every culture tube made from the blood, if taken before the third day of the fever. When rabbits are inoculated with it, it produces fever and an erythema, followed by a slight desquamation; and the bacilli can be reobtained from the animal's blood. The effects in guinea-pigs are similar, but the desquamation is more abundant, and the flakes thicker. In calves, the skin of the thorax becomes red, and an erythema develops; there is fever, and later desquamation.

Regarding the third question, Edington found that of seven cases in which

the treatment had been continued until the seventeenth day, the part being then wrapped in sterilized cotton-wool until the thirtieth day, and then examined for the presence of bacilli, none were present in five cases, and the cultures developed very slowly in the other two.

It seems then proven that the *bacillus scarlatinæ* is the specific cause of scarlet fever, and that the other microbes found are only concomitants. Yet one, which they call *diplococcus scarlatinæ sanguinis*, occurs very frequently with the bacillus, both in cultures from the blood and from the epithelium. It cannot as yet be definitely settled whether it modifies in any way the action of the bacillus. It is a fact that both organisms were found from the first in those cases which exhibited an extremely vivid and widespread eruption.

#### HEMIPLEGIA IN CHILDREN.

ABERCROMBIE (*British Medical Journal*, 1887, 1, 1323) says, that while all forms of paralysis in children were formerly grouped under the head of essential spinal paralysis, it is undoubtedly true that very many cases are due to a cerebral cause. The causes of hemiplegia in adults are hemorrhage, arterial obstruction, and tumors; and all these may be active in children. Cerebral hemorrhage in infants must be exceedingly rare. The only known causes of it are purpura hemorrhagica, the hemorrhagic diathesis, and aneurisms of the cerebral vessels; and, in a few instances, a highly vascular sarcoma has given rise to a large extravasation of blood. Meningeal and capillary hemorrhages may also occur, and it is conceivable that whooping-cough might also produce massive hemorrhage, though the author has never seen a case. Arterial obstruction from embolism due to heart disease, is occasionally met with, and it is strange that it is not oftener seen. Thrombosis may take place, brought about by previously existing disease of the vessels; syphilis probably causing hemiplegia in this way. Tumors are not uncommon, usually in the pons or crus. It must be also mentioned that tubercular meningitis not unfrequently produces unilateral paralysis.

But the author has observed some fifty cases of hemiplegia in children, only a few of which could be accounted for by any of the causes mentioned. The others may be divided into *two groups*—those which followed one of the acute infectious diseases, and a much larger group where no such cause could be assigned. In the first group hemiplegia oftenest succeeded diphtheria in the author's experience, though he has also seen it four times after measles, once after whooping-cough, and once after scarlet fever. In the second group there was evidence of congenital syphilis in four patients, and the other cases fall naturally into three classes, *i. e.*—(a) traumatic; (b) congenital; (c) neither traumatic nor congenital, nor due to any of the causes already described.

Traumatism during labor has undoubtedly been the cause of hemiplegia in some instances, but the author has seen only one case which was probably due to injury—that of a child who had fallen upon his head. He has also seen only four cases in which the paralysis could be called congenital. The last class of cases can only be subdivided into those occurring under two years of age, and those developing after that age. The first subdivision contains essentially the cases of infantile cerebral paralysis, and the author has the notes of fourteen of them, ten of which were in girls. The intellect was



usually much below par. In the second subdivision he has seen but four cases, two of them after epilepsy.

To sum up briefly the symptoms of hemiplegia in children: it usually attacks those under one year of age, commencing with a prolonged convulsion lasting hours or days. When the fit passes, the child is found to have lost its reason or speech, or both, and to be paralyzed on one side. Sensation is rarely affected; a little improvement may follow, especially in the leg. The paralysis may come on after one of the acute infectious diseases, or as a result of syphilis, but often no cause can be found.

The pathological conditions present are nearly always the same, viz., a sclerosis and atrophy of the convolutions in the motor area of the affected hemisphere, with thickening and opacity of the meninges. Various theories have been held concerning the production of the disease. Strümpell believes the cause to be polio-encephalitis, but this view demands further proof. The occurrence of capillary hemorrhage is advocated by Eustace Smith; while Goodhart believes that the convulsions produce cerebral congestion and then meningeal hemorrhage which gives rise to the paralysis. But the objection to these theories of hemorrhage is, that there should be no tendency for the effusion of blood to affect one part of the brain more than another, and the lesion in this disease is localized. Gower's theory is that it is due to thrombosis of the veins and sinuses occurring in debilitated conditions, or after blows on the head; while Goodhart admits that embolism is the probable cause after the exanthemata. The author believes that embolism is the principal cause of hemiplegia in children. The autopsies of some of his cases prove this, and he sees nothing in the symptoms of the other cases following the exanthemata incompatible with this view. In the syphilitic cases, too, the cause may have easily been arterial obstruction from the thickening of the vessels by disease; and the identity of the symptoms in the remaining cases renders the presence of arterial obstruction a probable explanation of them also. Moreover, the limitation of the lesion chiefly to the region supplied by the middle cerebral artery is another argument for the causal agency of embolism. In the congenital cases the pathological conditions are often more extreme than in the acquired forms. Frequently entire portions of the brain are wanting.

The diagnosis of the disease from infantile spinal paralysis is easy, from the fact that it is unilateral, and that the affected limbs are not flaccid, wasted, or cold, as in the latter disease.

The prognosis, *quoad vitam*, is good. The leg usually improves considerably; the arm to a less degree.

The treatment during the convulsion must be by warm or cold baths, as indicated by the bodily temperature. All possible sources of reflex irritation must be sought after and removed. A blister behind the ears of the side opposite that of the convulsed limbs would do no harm. Bleeding should be avoided, unless, perhaps, in a traumatic case where meningitis is suspected. After the convulsion a course of potassium iodide and alkalies, with faradization, may be commenced.

#### PERIODIC PARALYSIS.

COUSOT (*Rev. de Méd.*, 1887, No. 3, p. 190) gives a detailed account of five cases of periodic paralysis, and adds the notes of four others gathered from

the literature. Two of these, published by Westphal and Hartwig respectively, can be classified with his own; but the others seem to be of an entirely different nature, and probably belong to the class of paralyses due to malaria, which are quite distinct from the genuine periodic spinal paralysis, according to the author's definition.

The affection consists in attacks of paralysis occurring at intervals variable for different cases, though usually showing some regularity in any given case. They may appear daily, every few days, every week, etc. The degree of the paralysis varies even in the same person, sometimes being slight, sometimes absolute. The extent also varies in a similar manner, and at times even speech and respiration are partially involved. The attacks, which often occur in the night, are preceded by weakness in the joints, tingling, muscular pain, thirst, and perspiration. The paralysis then develops more or less rapidly, reaches a maximum lasting a variable time, and disappears by degrees. The total duration of the attacks varied in the author's cases from three to thirteen hours. The temperature is normal, the pulse but slightly, if at all, affected, and sensation and intelligence undisturbed. Profuse perspiration often attends or follows the paralysis. After the attack the muscles fully regain their power, and the general health is seen to be unimpaired. A most characteristic symptom is the temporary diminution or complete suppression of the electrical excitability in the paralyzed muscles, without any trace of the reaction of degeneration.

Concerning the cause and nature of the malady, no predisposing influence could be detected in any of the cases, and there was no history of malaria. The disease appeared in most cases in youth, and was of indefinite duration. In one case it disappeared permanently after childbirth, and in another lasted through life. Heredity seems to play some part in its production, as all of the author's cases were members of one family.

There appears to be no other disease with which it can be easily confounded, or to whose domain it can be assigned. The author believes the paralysis to be one of *inhibition*, but whether the point of departure is peripheral or central cannot be decided.

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#### LANDRY'S PARALYSIS.

No advances have been made in the study of this disease since it was first described, while many cases of other disorders have undoubtedly been published as instances of it. MANN (*Med. Chron.*, 1887, vi. 99) reports a case coming under his observation. The patient, aged forty-eight, without syphilitic or neurotic taint, was attacked by a sensation of cold and tingling in his toes and feet, accompanied by cramp-like pain, which soon disappeared. Diminution of power in the legs and feet rapidly developed, so that in less than a week he was totally unable to walk, although he could still move his legs. At the end of a week from the onset of the disease the legs and trunk were absolutely paralyzed, and the arms involved to a great extent. Sensation was unaffected; there was no pain or tenderness; no spasm; no fever. The electrical reactions, both qualitative and quantitative, were normal; the reflexes were everywhere abolished; mastication, deglutition, and respiration were undisturbed. A large amount of albumen was found in the urine. On the next day the arms were totally paralyzed, and some embarrassment of

respiration was observed. This latter symptom became better, but returned on the same day, and the patient died apparently from asphyxia, with the intellect clear.

At the autopsy no lesion could be found anywhere in the nervous system, nor did the muscles reveal any change. The liver was swollen and filled with blood; the kidneys deeply congested.

This case is an instance of typical Landry's paralysis. Viewed from a clinical standpoint it could not have been acute disease of the anterior cornua, on account of the absence of fever, the continuously progressive spread of the paralysis, and the character of the electrical reactions. It ran too rapid a course for us to take muscular atrophy into account. Multiple neuritis would have exhibited pain, tenderness, anæsthesia, and altered electrical relations. Myelitis and meningeal hemorrhage are excluded by absence of sensory and trophic disturbance, and of pain in the back and spasm respectively. We are limited then to one of two inferences; either there was some lesion of the gray matter too fine to be detected by our methods of research, or some toxic influence was at work. The first hypothesis cannot be entertained in the presence of a paralysis so widespread as this. We must then accept the second, that by some selective toxic agency the nerve molecules in some part of the motor tract were deprived of their potential energy. This was the view of Landry, Westphal, and others.

Two questions now arise: first, as to the nature and origin of the poison; and, second, on what part of the motor tract does it act. It is more than probable that substances closely resembling the cadaveric alkaloids may be formed in the body during life, under the influence of certain morbid processes; and this without the intervention of microorganisms. These substances may act poisonously on the nervous system, just as we see many of the vegetable alkaloids exercising a selective power as to the part of the nervous tissue attacked. The author examined the blood for ptomaines after the patient's death, but failed to find any. This, however, is no proof of the absence of the poison, since great difficulties attend the investigation, and many of the alkaloids of this class are very unstable.

The second question, regarding the localization of the inhibitory influence, is a matter of inference only. It seems most likely that it is exerted on the gray matter of the anterior cornua, at the termination of the upper segment of the spinal motor path, not on the ganglionic cells. Why the paralysis almost invariably appears in the lower extremities first is difficult to understand; but the author attempts to explain it on the ground that the assumed toxic agency interferes with the conduction of the motor impulses from the cortex through the cord, and these consequently first fail to reach the more distant lower extremities, since the absorption of energy is proportionate to the amount of inhibited tissue through which the motor impulses must pass. It is on this account that the invasion of the disease is almost imperceptible; but as the inhibitory influence increases in power the paralysis travels upward.

The absence of bulbar symptoms was a peculiar feature in the author's case, and one not easily explained.



## THE HEREDITARY CHOREA OF ADULTS (HUNTINGTON'S CHOREA).

HUBER (*Virchow's Archiv*, Bd. cviii. H. 2, 267-286) reports a series of cases of this excessively rare disease. According to the definition of Huntington, who first described it, hereditary chorea is characterized as follows: 1. It is inheritable, and there are whole families afflicted by it. If a generation once escapes, the power of the disease is lost, and it does not appear in the family again. 2. It begins as an ordinary chorea, increases to the greatest degree, often leads to mental derangement with suicidal impulse, and finally ends in death. No case of recovery has been observed. 3. It begins usually between the ages of thirty and forty years; seldom beyond this, and never in youth.

The first case was that of a man seen in the Zurich clinic in 1886. He was thirty-eight years of age, and exhibited choreic movements of great intensity and extent, perfectly incoördinated, and almost universal, although not nearly so violent in the legs as in the arms and head. Even the tongue and the soft palate frequently underwent involuntary movements. There was no evidence of paralysis anywhere, or of any alteration of sensation; and the electrical reaction and the reflexes were normal. The speech was interrupted, slightly nasal, and indistinct, as though the patient had something in his mouth. Prescribed movements with the arms and hands were performed with surprising certainty, and the choreic motions almost disappeared for the time; the handwriting, however, showed that voluntary control over the hands was not complete. He walked with difficulty. The disease began eight years ago with twitching of the eyelids, then of the mouth, and within a year, of the shoulders, head, and arms. For the first six years there was scarcely any disturbance of motion in the legs; and six months ago he could speak perfectly well. On investigation it was found that the sister, father, two paternal uncles, and an aunt, and the paternal grandfather and great-grandfather were affected by the same disease. In another branch of the family, descended from this same great-grandfather, there was a second cousin of the patient, together with his father, who suffered from chorea, developing late in life. The author was unable to learn anything regarding the mother of this father last mentioned (*i. e.*, the daughter of the choreic great-grandparent), but it is certainly possible that she had chorea; and the law of Huntington concerning heredity is therefore not broken. In that branch of the family the disease was not so pronounced as in the case described; but in the sister of this patient—whom, also, the author was fortunate enough to see—it was very typical. Here the patient, aged forty-two, had commenced thirteen years before to be somewhat slow both in body and mind, forgetful, and listless. After six years, choreic movements began in the shoulders, and in two years became almost universal, while some affection of the speech had developed. When examined in 1886, she exhibited even more pronounced movements than her brother; her face had a rather stupid expression, and she was totally unable to speak; she could not extrude the tongue, and this organ was decidedly hypertrophied and was in continual motion. In this case, too, intended movements were performed very well, and the chorea diminished temporarily. The legs were much less affected than the arms. The patient died later. Her daughter was below average intelligence, but was only ten years of age and chorea had not yet developed.

Huber was able to learn of the father that he had died in an asylum, the diagnosis being chorea and imbecility. His disease began in his forty-fifth year with choreic motions, which gradually grew worse, and were associated with unintelligible speech and increasing weakness of intellect. At times he suffered from attacks of mania resembling those of epilepsy. Toward the end of life the imbecility became extreme, and the movements almost ceased.

He thinks the name chorea must certainly be applied to these cases, although the two which he himself observed differed in some respects from the ordinary form, especially in that with intended movements the choreic became very slight or even ceased. And in all the cases included in this report the disease first manifested itself in adult life. It could not be learned that the chorea of childhood had ever occurred in the family.

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#### THE PATHOGENESIS AND TREATMENT OF DIABETIC COMA.

LEPINE (*Rev. de Méd.*, No. 3, 224) does not believe that either acetone or diacetic acid is the cause of the coma occurring in the course of diabetes, but considers it due to lessened alkalinity of the blood. Stadelmann determined that there was an acid actually produced in diabetes, by which the blood's alkalinity was diminished. This he found in the urine and believed to be crotonic acid, although later researches by others have shown it to be  $\beta$ -oxybutyric acid. He, therefore, treated his cases with large doses of bicarbonate of soda, administering even as much as 100 grm. per diem. If coma had already developed, he recommended large intravenous injections. Although Wolpe followed this plan of treatment without success, Lepine attempted it in one instance, and reports the details of his experiment. In a very severe case of diabetes, in which coma had already developed with a temperature of 96° F., he injected into the median cephalic vein 1.5 litres of water at 104° containing 8 grm. of sodium chloride and 34 grm. of sodium bicarbonate. The temperature immediately rose to 97.5° and the coma became less profound. Twelve hours later he administered a second injection, just before which the blood was found to be nearly neutral, and shortly after which the urine was very decidedly acid but contained no glucose. Again there was temporary improvement, but the patient died some hours later. From the condition of the urine and the blood it is evident that some acid existed in the economy capable of neutralizing an enormous quantity of alkali. Lepine does not think that the combination of this acid with a base is the object to be attained in giving alkaline injections, for the salts produced are also poisonous. The introduction of soda into the economy acts rather as favoring the destruction and elimination of the poisonous acid. We should, therefore, begin the treatment as early as possible in grave cases, in order to prevent the formation of the acid. An exclusive diet of meat is to be avoided in diabetes, since it is in cases receiving this diet that coma is especially liable to develop.

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#### CONTRIBUTION TO THE DIABETIC DYSKRASIA.

In connection with the article just mentioned, that by HUGOUNENQ (*Rev. de Méd.*, 1887, p. 30) is of interest. This author had the opportunity of studying a case dying with diabetic coma. He examined—1. The urine of the patient before any treatment was instituted. 2. The blood; drawn before a solution

of forty-four grains of bicarbonate of soda was injected into the veins. 3. The urine after this injection. In the first specimen he found  $\beta$ -oxybutyric acid in addition to sugar. In the second specimen, the blood, he found the same acid. The third specimen contained neither the acid nor sugar. In an effort to explain these facts the author takes up the chemical relationship of glucose to some of its derivatives.  $\beta$ -oxybutyric acid is the homologous superior of lactic acid of the muscles. Its formation at the expense of diseased tissue is no more remarkable, then, than the production of the latter acid in the wearied muscle. Diacetic acid is but a further oxidation, and is, in fact, found in the urine with  $\beta$ -oxybutyric acid. Diacetic acid is, however, very unstable, and readily changes into acetone, the last of the series. By just what process in the living body sugar is converted into  $\beta$ -oxybutyric acid, and thus the chain from glucose to acetone completed, is not understood. Outside of the body there is a simple method by which the change may be brought about; the glucose becoming alcohol, aldehyde, and then aldol, before it reaches the condition of  $\beta$ -oxybutyric acid. The same result is certainly attained ultimately in the body, whatever the method may be.

These studies show us how, in the diabetic dyscrasia, glucose or the various compounds derived from it, leave the body before being completely consumed into water and carbonic dioxide, as is the case in health. Thus the organism loses the heat of their combustion; a part of the chemical energy from which it draws its strength. Rational therapeutics teaches us then to attempt to consume these substances in the economy. As the reaction described proves, this can be very well accomplished by means of alkali, and this plan of treatment should not be neglected.

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#### PARENCHYMATOUS MYOSITIS.

Several interesting accounts of cases of this little known disease have recently appeared in the German medical press. HEPP (*Berliner klin. Wochenschrift*, 1887, No. 17, 297, and No. 18, 322) reports a form of acute parenchymatous myositis which he entitles "Pseudo-trichinosis." It is an exceedingly rare affection, and but two cases, he states, are to be found in the literature which can be classified with it. It consists of an acute parenchymatous inflammation of nearly all the skeletal muscles; seeming to be an independent disease, but probably of an infectious nature, although no cause can be found for it. It presents in its symptoms the greatest similarity to trichinosis, and may, like it, cause death.

The case in question was that of a woman, aged thirty-six, who after feeling not quite well for some weeks, was suddenly attacked by angina and an exanthem. Both disappeared soon, but eight days later progressively increasing pain, swelling, and stiffness of the muscles developed. When admitted to the hospital about two months after the first symptoms had made their appearance, she lay helpless on her back in bed. The face about the eyelids, and the limbs except the hands and feet, exhibited a peculiar hard œdema which pitted with difficulty, and which transformed the arms into firm, cylindrical, swollen masses. The affected muscles everywhere were in a permanently stiff, contracted condition, without elasticity. There was no tenderness or pain when at rest or on limited passive motion, but more extended movement



caused great suffering. The patient was unable to lift her head from the pillow, and could scarcely move her arms; while her legs were in not much better condition. The fingers, feet, and toes could, however, be moved with ease. The muscles of the face did not appear to be involved, and the joints everywhere were unaffected; the tendon reflexes were abolished, and the electrical excitability diminished. None of the inner organs gave evidence of disease, but the urine contained considerable albumen.

Her condition while in the hospital grew steadily worse. Cramp-like pain, increased swelling of the skin, still less power of motion, a nasal voice, cough with great difficulty in expectoration, trouble in swallowing, and great tenderness and hyperæsthesia were noticed; there was more or less fever, and much weakness. The difficulty in swallowing grew worse, and attacks of suffocation intervened, in one of which she died, eleven days after admission and in the eleventh week of the disease.

The autopsy revealed a widespread degeneration of all the striated muscles except the heart, diaphragm, and the muscles of the orbit. Macroscopically they were pale, yellowish, saturated with fluid, easily torn, and resembling in appearance the flesh of rabbits or fish. Microscopically a hyaline degeneration became visible, having produced in some places entire destruction of the contractile substance. There was virtually no small-celled infiltration, and the process had evidently taken place in the muscle fibre itself. There was no fatty or granular degeneration, as in trichinosis.

The author feels justified in calling this a case of acute parenchymatous myositis. The disease may be distinguished from multiple neuritis by the limitation of the pain to the muscles, their peculiar consistence and stiffness, and the unusual hardness of the œdema. Œdema of this type is met with in different varieties of myositis, as the syphilitic, rheumatic, ossifying, ischæmic; sometimes in myositis attending the acute infectious diseases, including tetanus; and in trichinosis. It is of an inflammatory nature, while that seen in neuropathic paralysis is vasomotor in origin, and is not so hard; nor is it limited to districts of inflamed muscle. Even from a purely clinical point of view this case could not have been trichinosis, for no trichinous flesh had been eaten, there had been no gastro-enteric symptoms, and the diaphragm and muscle of the eye were not involved. The angina at the outset suggested myositis following diphtheria. But there had existed no diphtheria in the family, and such a process, dependent on this disease, has never been observed.

The author then describes the two cases in the literature to which he had referred. They were reported by Potain and Marchand respectively, and both ended fatally. He claims that they were almost identical in their symptoms with his case, and must be classified with it.

In a later publication (*Ibid.*, 1887, No. 22, 389) the same author describes a case of severe parenchymatous inflammation of circumscribed muscle masses of the right gluteal region and the right upper arm, leading to amyloid degeneration with the production of fluctuating swellings without pus, and accompanied by hard, circumscribed œdema of the skin. The patient, a man of twenty-one years, fell in a violent epileptic fit, biting his tongue severely. Weakness and pain produced repeated falls on the same day, and he probably bruised his muscles considerably. His tongue became swollen

and partly covered with a diphtheritic deposit; and the author believes that through some infection from this source the severe parenchymatous inflammation of the muscles was produced, instead of the suppurative process which might have ordinarily followed the bruising.

Hepp refers to interesting cases reported by Kreiss, Giess, and Wagner. Those of the two former were likewise instances of localized parenchymatous myositis, but that of the latter must be classified with Hepp's first case.

WAGNER'S case (A Case of Acute Polymyositis *Deutsches Archiv*, Bd. xl., H. 3-4, 241) was that of a woman, aged thirty-four, presenting the symptoms of tuberculosis of the left apex. She complained also of some pain and stiffness in the back, loins, neck, shoulders, and joints of the hands, together with some oedema. There was no history of taking cold. Later both arms became much swollen, the contour of the muscles disappeared, there was no pitting or tenderness on pressure. The swelling gradually diminished somewhat, and became much softer. There was no tenderness over the nerve trunks, disturbances of sensation were nowhere marked, and the electrical reactions were always normal. The cough gradually grew worse, and attacks of suffocation on attempting to swallow made their appearance, which did not seem to be commensurate with the slight degree of the tuberculous process. In one of these attacks she died, having been under observation two months.

The diagnosis had presented some difficulties. No obstruction to the circulation could be found. The painlessness of the nerve trunks with the normal electrical reactions excluded neuritis. The presence of rheumatism was possible; but the greatest likeness was to trichinosis, although the freedom from involvement of the legs and face excluded that disease. The autopsy revealed an extensive disease of the muscles throughout the body. Those of the arms were pale red, of a peculiarly stiff consistence, of a rather homogeneous appearance, saturated with serum and easily separable into fibres. Nearly all the muscles of the upper half of the body, including the intercostals and diaphragm, were more or less affected, either throughout or in spots. There was no affection of the joints. Microscopically both fatty and amyloid degenerations of the muscles were found. A small-celled infiltration was seen in parts, and a partial reformation of the fibres. The author gives a detailed description of the microscopical appearance, accompanied by several woodcuts.

He reviews carefully the various published cases which seem to him to resemble his in any particular, and concludes that his case was one of the most acute forms of progressive muscular atrophy, adducing at length his reasons for this belief.

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#### EXTREME FREQUENCY OF THE PULSE AFTER PARACENTESIS.

DEHIO (*St. Petersb. Med. Wochensch.*, quoted in *Lancet*, 1887, 1, 1098) reports an interesting case of paracentesis for ascites in cirrhosis of the liver. The pulse had been 86, regular, and of moderate tension. No heart disease could be detected. On the day after the operation the pulse was 162 and thready, and the patient was pale, and complained of dizziness and prostration. After five days of rapid pulse 0.002 grm. coronilin was given subcutaneously, fol-

lowed by a reduction of the pulse to 80 for a few hours only, after which it rose to 180. On the next day it again sank without the use of coronilin, to 84, and did not rise again. The patient, however, became worse, and died after eighteen days.

At the autopsy there were found fatty degeneration of the heart, general arterio-sclerosis, and some hemorrhagic pachymeningitis, with considerable clear fluid in the ventricles. Dehio considers that the anæmia of the medulla following the operation, was undoubtedly the cause of the rapid pulse. This either stimulated the accelerator or paralyzed the inhibitory centre. Extreme frequency of the heart-beat, with weak cardiac impulse, and no arrhythmia, indicates, according to Nothnägel, paralysis of the inhibitory apparatus; and Traube has reported a case which he explains in a similar manner. The author believes that this is also the correct explanation in his case. It is scarcely possible, moreover, that stimulation of the accelerator apparatus should have continued so many days without any sign of fatigue of the centre. As the abdomen began to fill with fluid again, the medulla became engorged with blood, and the vagus resumed its normal functions.

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#### THE ETIOLOGY OF ENDOCARDITIS.

FRÄNKEL and SÄNGER (*Virchow's Archiv*, B. cviii. H. 2, 286-397), while admitting that bacteriological studies of later years have shown that the most different forms of disease may depend on the same germ—tuberculosis being, perhaps, the best example of this fact—say that the same studies teach that sometimes different microorganisms may produce similar clinical symptoms. Endocarditis is a case in point, and the authors have endeavored to determine what forms of it were caused by microorganisms, and which of these bodies were the factors in each case. They report thirteen cases examined bacteriologically during the last year; detailing in full their methods of procedure, both as regards the culture of the microbes and the inoculation of the same in animals, and giving the conclusions derived from their experiments. They found eight species of microbes in all, six of which were pathogenic. In studying the cases with reference to these organisms, the authors show that there is no one variety which is the specific cause of endocarditis. Sometimes one species was found in the deposit on the endocardium, sometimes another; and in one instance three different kinds were detected. The *staphylococcus pyogenes flavus* was the one by far most frequently present. It has been proved that many species of microorganisms may be made to produce artificial endocarditis. Netter even found the pneumococcus of A. Fränkel in the vegetations of eight cases of endocarditis complicating pneumonia, and succeeded in producing endocarditis in rabbits with it.

It is worthy of note that the microbes showed such continued vitality in some of the authors' cases, where the affection of the endocardium was certainly very old. This may explain the tendency so often observed toward a recurrence of endocarditis. Yet their vitality is not unlimited, and the negative bacteriological results of some of the cases may have been due to the death and disappearance of the bacteria formerly present. They believe with Weichselbaum, Klebs, and Köster, that verrucose as well as ulcerative endocarditis is a disease of purely mycotic origin, and think that the two forms



should not be separated etiologically. But as they have noticed repeatedly that the microbes are far less abundant in the verrucose forms, they believe that the number present may have some influence in determining the type of the disease.

Atheromatous endocarditis is the only kind which is certainly non-mycotic. The true nature of the so-called fibrous, sclerotic, chronic variety is doubtful. It seems not improbable that it is frequently only the terminal stage of a verrucose endocarditis, and hence is of mycotic origin.

It is a remarkable fact that coagulation-necrosis is the lesion usually observed on the valves, and that true suppuration so rarely occurs, although the pyogenic staphylococci are the ones usually present. This may be due to some peculiarity of the bloodvessel supply, for it has been noticed in some cases that while the valves have become coagulation-necrotic, abscesses have developed in the heart muscle. On the other hand, the presence of some other microbe with the staphylococci may in some way modify the action of the latter. The authors agree with Orth that the bacteria are usually deposited directly on the valves from the blood current; but believe, too, that in some cases they may reach their destination through the coronary arteries. Regarding the question, whence and how the microbes gain access to the valves, it is interesting to note that in seven of the cases reported suppuration was going on somewhere in the body.

That the left side of the heart is the one usually attacked, may be due, as Virchow supposes, to the greater blood-pressure forcing the bacteria between the endothelial cells. The authors are, however, inclined to the view that it is because the microbes develop better in the oxygenated blood of the left heart, since, as Liborius has shown, oxygen is necessary for their vital activity.

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#### CONTRIBUTION TO THE DETERMINATION OF THE PERCUSSION LIMITS OF THE STOMACH.

PACANOWSKI (*Deutsche Arch. f. klin. Med.*, B. xl. H. 3 and 4, 342), in speaking of the limitations to the physical examination of the stomach, says that Penzoldt's method for determining its boundaries by pouring in water through the sound, and then outlining the position of the dulness, is accurate but unpleasant, and dangerous if ulcer be present. The same is true of Leube's process of feeling for the end of the sound through the abdominal and gastric walls. Rosenbach's and Schreiber's methods are too complicated for ordinary use. Frerichs's device of dilating the stomach with carbonic dioxide, and then percussing, is not accurate, and may be attended by danger.

The author has examined eighty-one cases (fifty-five men and twenty-six women) by simple percussion; sometimes two to three hours after the chief meal, sometimes when no food had been taken, and has corroborated his results in many cases by employing Penzoldt's method. Of the four boundaries to be determined, the lower is the most important for practical purposes. The others vary but little, except when artificially distended with carbonic dioxide; and to determine them the patient was always examined while upon his back. The lower part of the right border can scarcely be determined by simple percussion, since it lies below the edge of the liver, and to the right of the middle line. When, however, the viscus is artificially dilated with gas,

the difference between the sound of this part of the stomach and that of the adjacent colon can be often distinguished. The upper part of the right border is very easily determined by ordinary percussion. The left boundary cannot be located with certainty. The upper border is partially covered by the lung, hence deep percussion shows us the actual upper limit of the stomach, while light percussion reveals the portion not at all covered by pulmonary tissue. The first of these reached, as a rule, the lower edge of the fifth rib, or the fifth interspace in the left parasternal line; the fifth interspace or the lower edge of the sixth rib in the left mamillary line, and the lower margin of the seventh rib, or upon the eighth rib in the left anterior axillary line. To determine the lower border of the stomach, the author first examined the patient while recumbent, in order to discover whether the organ could be distinguished from the colon. Its percussion tone is more tympanitic and duller than that of the large intestine, and frequently varies slightly with respiration. He now let the patient stand, administered a half litre of water, and sought for a line of percussion dullness, which would disappear when the patient again assumed the recumbent position. This line marked the lower border. There are some difficulties with this plan, viz., that on standing, the whole gastric region often becomes dull, owing to the unavoidable tension of the abdominal walls. Yet the dullness of the water in the viscus can, as a rule, be detected if care be used. The author further employed Frerichs's method in all cases, excepting those in which there was heart disease, or a gastric ulcer was suspected. Too great distention must not be allowed, or the true boundaries become displaced, and false results are obtained. He locates the lower border of the stomach at a distance above the navel in the parasternal line of 3-5 centimetres in men, 4-7 centimetres in women. He has never seen it extend below the navel. In his own cases he found the stomach to be 7 to 20 centimetres in height in men, the average being 11-14 centimetres. In women, it varied from 7 to 13, with an average of 10 centimetres. The breadth in men was usually 21 centimetres, the maximum being 25, the minimum 16. In women it varies from 15 to 22, the average being 18 centimetres. Thus the relation of the height to the breadth in men is 1:1.5 or 2, and in women about 1:2.

#### DYSENTERY, AND THE METEOROLOGICAL CONDITIONS INFLUENCING IT.

HIPPIUS (*Deutsches Archiv f. klin. Med.*, Bd. xl., H. 3 und 4, 284) publishes an elaborate article on this subject with six tables, five of which contain graphic curves showing the relation of the daily number of cases of dysentery during five years to various meteorological conditions. His observations are founded on 2507 cases treated at the St. Wladimir Children's Hospital in Moscow. The sixth table gives two curves comparing the number of cases of dysentery with that of catarrh of the stomach and small intestine taken together, and showing that they are almost parallel.

The conclusions drawn from his tables are:

1. Either continued elevation of the temperature of the air, or a sudden cooling of the same, increases the number of cases of dysentery.
2. Dysentery begins in spring when the temperature exceeds 50° F., but may continue into autumn even when the meteorological conditions are not favorable to its existence.

3. Dampness of the air is favorable to the development of the disease. The number of cases in hot weather increases if there is a sudden increase of humidity, and especially if there is a simultaneous diminution in the temperature of the air.

4. The injurious influence of these sudden variations in temperature and humidity is more noticeable in the first half of the summer than in the second.

5. Very cloudy weather, high winds, and a large amount of ozone in the atmosphere are rather unfavorable to the development of dysentery, but their influence is only secondary.

6. Barometrical pressure, the amount of rain-fall, the number of rainy days, and the number of thunder storms have no influence on the disease.

The maximum age of the patients whom he examined was about twelve years. In the beginning of summer two-thirds of the cases were under two years of age, but in August and September the greater number were older than this. He is of the opinion that epidemic and sporadic dysentery are identical, and that every case must be considered of a contagious nature; though in just what way sporadic cases become thus infectious cannot as yet be explained.

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#### FUNCTIONAL DISEASES OF THE LIVER.

FENWICK (*Lancet*, 1887, i. 1171, 1217, 1271) has for years been endeavoring to determine whether any of the secretions would show how completely the hepatic functions were being performed; and has discovered, he believes, that the amount of the sulphocyanide in the saliva might be taken as the index of the activity of the liver.

Specimens of the saliva mixed with a solution of the perchloride of iron produced blood-red tints of varying intensity, depending on the amount of sulphocyanide present.

These tints were compared with a scale of colors which the author had had prepared, or with a series of solutions of the sulphocyanide of iron of known strengths, varying in both directions from a shade called "normal"—this shade being obtained by the examination of the saliva of a large number of healthy persons. In this way he made thousands of examinations, and compared the amount of sulphocyanide with the symptoms of each case.

In health there was comparatively little variation, the saliva of females giving a shade oftener slightly below than above the normal color. In typhoid fever the amount of sulphocyanide was greatly diminished; increasing suddenly when the temperature fell and convalescence began. Sometimes the increase became evident a week before the fever disappeared, and constituted a valuable prognostic sign. Instances of other diseases are also quoted to show that when there was a gain in weight and strength, with greater activity of the digestive organs, the amount of the salt was increased; but that it was diminished if emaciation was progressing. The sudden change from an abundant to a scanty secretion in any disease where a drain was made upon the organism—as in chronic nephritis—indicated the commencement of failing strength and health—*i. e.*, the expenditure was exceeding the income of the system.



This change is best explained by supposing an alteration from a condition of overstimulation to one of depression of the digestive organs.

Inquiry into the state of the salivary salt in diseases of these organs where no demand was made on them for special exertion (as is the case in wasting diseases) showed a positive relation of the quantity of the salt to the condition of the digestive tract. In atonic dyspepsia, and in chronic diarrhoea and dysentery the sulphocyanide was decidedly diminished; and in cancer of the stomach this was very early the case, before cachexia and emaciation had begun. In some cases of ascites from cirrhosis of the liver it was much below normal; rising at once and very greatly after tapping. This rise was probably due to the relief of the pressure on the portal vessels and of the passive congestion of the digestive organs. It was not due to impaired digestion itself; for in cases of ascites where the stomach also was disordered, tapping produced no improvement in the amount of sulphocyanide. In jaundice the salt was very deficient, and Fenwick thinks it probable that bile must enter the intestine in order that sulphocyanide be secreted. Acute congestion of the liver exhibited augmented secretion. In chronic congestion following cardiac dilatation or mitral disease the amount was diminished, but when steady improvement in the symptoms took place a weekly increase in the quantity of the salt was observed. As regards other diseases, there was a striking augmentation of the sulphocyanide in acute rheumatism, but none in chorea. In gout and urticaria the secretion was above normal. Headache, especially of the bilious variety, was very common in persons exhibiting an increase of the salt; while in headache of a purely neuralgic nature the quantity was usually diminished. A great excess of it in old people was sometimes the precursor of grave changes in the vascular system.

Fenwick claims that the origin of the sulphocyanide is plainly connected with the exercise of the nutritive functions. Its relations to ascites, and its diminution in jaundice show that it is not due simply to chemical changes the result of gastric digestion. Lead is said to be directly depressant to the action of the liver; and it is a remarkable fact that in every case of lead colic which the author examined the sulphocyanide was absent from the saliva. The same circumstances tending to promote a free secretion of bile are accompanied by a free secretion of the salivary salt; and the author concludes that its presence in the saliva is connected with the action of the hepatic cell. He believes that it is formed from one of the constituents of the bile—the taurocholate of soda—after it has reached the duodenum. But the formation of the taurocholate of soda depends on a full supply and digestion of albuminous food; for it is probably developed from peptones after they have been absorbed from the intestines. Hence the sulphocyanide is dependent primarily on the action of the other organs of digestion as well as on the hepatic cell, though we are justified in taking its amount as the index of the action of the liver especially.

So far as therapeutic indications are concerned, Fenwick advises that the use of alcohol be stopped, and the amount of albuminous and fatty food diminished when the salivary salt is abnormally abundant. In the reverse condition tonics and a liberal diet are to be employed. Lead is the only drug capable of directly diminishing the amount of sulphocyanide, though other

substances affect indirectly. Cod liver oil seems especially efficacious in increasing the quantity.

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#### ON A PECULIAR OCCURRENCE OF WHITE, CLAY-COLORED STOOLS.

Under this title PEL (*Centralt. f. klin. Med.*, 1887, No. 17, 297) writes that the brown color of the normal feces is due to two factors; 1st. Decomposed biliary matters, and 2d. The nature of the food taken. Under pathological conditions or after certain medicines the natural color may be altered. White, clay-colored stools have always been considered absolutely characteristic of complete obstruction of the ductus choledochus, with the consequent total absence of bile from the intestines; the feces containing undigested fat. The author reports a case in which typical clay-colored passages occurred without any such obstruction. The patient had a history of attacks of biliary colic, and at the time of examination there were icterus, enlargement of the liver, urine containing bile, and the typical stools referred to. In a few days the icterus and biliary urine had disappeared; some enlargement of the liver remaining. During four months the patient had several light attacks of colic from gall-stone; and three times exhibited slight icterus for a few days. During the whole time there was not the slightest change in the character of the stools, which were always white and clay-colored in spite of a mixed diet containing comparatively little fat. The cause of this peculiar condition was a question of great interest. There was certainly no degeneration of the liver cells, for the patient was in excellent general health. That icterus and biliary urine had existed, and that the passages had no unusually unpleasant odor proved that the bile was not lacking in some important constituents (as in the *bile incolore* of Ritter and Charcot). Careful chemical and spectroscopic examination showed that the bile *in toto* and in sufficient quantity had entered the intestine. Perhaps in this case it was transformed chiefly into chromogen instead of into urobilin as under normal conditions.

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#### CAUSE OF THE RED COLOR OF NON-SACCHARINE URINE ON ADDING PICRIC ACID AND POTASH.

In view of the extended use of picric acid as a test both for albumin and glucose, it is well to be aware of the fact that a saturated watery solution of this reagent produces in normal human urine a precipitate, which, according to JAFFE (*Zeitschr. f. physiol. Chemie*, vol. x. p. 391) consists of uric acid crystals, and of fine needles of creatinine-potassium picrate. The picric acid, it is said, precipitates uric acid even more completely than hydrochloric acid. Furthermore, if to a solution of creatinine a little picric acid solution and then a few drops of a solution of caustic soda or potash be added, the mixture will assume at once, and in the cold, a beautiful red color, which is turned yellow by acetic or nitric acids. This reaction (which all who have employed the picric acid test for glucose must have noticed) can be obtained in a solution of 1:5000, and is, therefore, directly applicable to the urine. Acetone gives a similar reaction, but the red color has a yellow shade. Creatine gives a yellow color at once, which only gradually changes to red. Other bodies—such as glucose and uric acid—give the red, *but only on heating*.

## TWO NEW PATHOLOGICAL COLORING MATTERS IN URINE.

In a patient suffering from osteomalacia, cystitis, and nephritis, LEUBE (*Archiv f. path. Anat.*) observed that the urine became of a dark violet or almost black color on being exposed to the air. The (amorphous) coloring matter is soluble in ether, from which it can be extracted by dilute alkalies, but not by acids. The alkaline solution is at first brownish-red, and, later, yellow. It is soluble in hot water, chloroform, benzol, etc.

In the urine of a woman afflicted with malignant hepatic disease, THOR-MALEN (*Virchow's Archiv*, vol. cviii. p. 317) observed in using the sodium nitroprusside and caustic soda test an unusual reaction. The primary red color, namely, on the addition of acetic acid neither became lighter, nor changed to crimson (acetone), but turned a beautiful blue, which became red and blue again alternately on adding an alkali or acid. He found the coloring matter causing this reaction to occur normally in the urine of horses and cats, from which it can be separated by the action of plumbic acetate.

## CAUSE OF THE DEVELOPMENT OF SULPHURETTED HYDROGEN IN URINE.

Under pathological conditions it sometimes occurs that the urine while still in the bladder contains  $H_2S$ . Many hypotheses have been advanced, with more or less success, to account for this condition, such as absorption from the neighboring intestine, etc.

In a case of cystitis, characterized by the freshly voided urine containing great quantities of  $H_2S$ , ROSENHEIM (*Fortschritte d. Med.*, vol. v. p. 345) was able to isolate from the urine a bacillus which appears to have the property of causing the evolution of this gas. It also has feeble powers of decomposing urea into ammonium carbonate. The author omits to state whether catheters had been used in the case, but it is to be presumed that they had been and that they were the means of introducing the bacillus.

In this connection it may be of interest to note that RATTONE and VALENTA (*Archivio per le scienze mediche*, vol. x., p. 311) have discovered a micrococcus which causes hippuric acid to be changed into benzoic acid and glyccoll. This accounts for the spontaneous disappearance of the hippuric acid from urine exposed to the air.

## SURGERY.

## IN EUROPE.

## UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,

SURGEON TO, AND LECTURER ON ANATOMY AT, THE LONDON HOSPITAL.

## RECENT SURGICAL LITERATURE.

The following volumes of the *Dictionnaire Encyclopédique des Sciences Médicales* have appeared since the last issue of this journal. The volume "Phan" to "Phos" contains a very useful and careful article on the "Pharynx," by



MM. ARNOGAN and MOURE. The pathology of the pharynx is very fully dealt with. M. MATHIEU contributes the monograph on "Phymosis" and "Paraphymosis." The work is exceptionally verbose, and occupies no less than seventy-two closely printed pages. The value of the article is seriously damaged by its diffuseness.

The article on "Phlebitis" is disappointing and not up to date. It ignores the important contributions of recent German writers to our knowledge of this affection.

In the volume "Thro" to "Traf" the principal surgical papers are the following: "Thymus," a very valuable paper. "Thyroid:" The Anatomy and Physiology of the Gland, by Drs. HERRMANN and TOURNEAUX; and the diseases of the same, by BROCA. The latter monograph is singularly complete and well up to date. "Tibia:" An account of the anatomy of the bone, and of the fractures incident to it, by M. HEYDENREICH. "Torticollis," by M. GUYON. "Trachea and Tracheitis," by M. CHERMONT.

The volume "Epid" to "Erec" contains a very excellent monograph on "Epistaxis," by MM. TORGUE and BOINET.

In the volume "Ute" to "Val" the papers on the "Uterus" are completed, and an excellent account of the "Anatomy, Physiology, and Pathology of the Vagina" is furnished by M. PETIT.

The volume "Hæma to Hemor" contains a very useful treatise on "Hæmatocèle," by M. PAUL RECLUS; a feeble monograph on "Hæmaturia," by DR. BOUREL-RONCIERE; and the commencement of an elaborate paper on "Hemorrhage."

*Internal Derangements of the Knee-joint.* By DR. SCOTT LANG (Edinburgh, 1887). This little monograph represents the author's graduation thesis. It deals solely with luxations and subluxations of the semilunar cartilages of the knee-joint. The luxation of either cartilage may be complete or incomplete. In no case would it appear that both cartilages may be displaced at one time. The incomplete displacements are the more usual, the complete being rare. The internal cartilage is much more frequently displaced than the external. The author enters at length into the anatomy and causation of the lesion, and this portion of the monograph is very valuable. He shows that luxation of the internal cartilage occurs when the leg is rotated outward, while luxation of the outer cartilage follows an inward rotation of the limb. In the matter of treatment the author has nothing new to propose.

*Leitfaden zur antiseptischen Wundbehandlung,* by PROF. NUSSBAUM (Stuttgart, 1887). This guide to the antiseptic treatment of wounds has now reached the fifth edition, and when compared with the first issue it is practically a new work. It forms a treatise upon the circumstances of wound healing that has no rival. It is singularly complete. The subjects of infection of wounds, of fat embolism, of the accidents and morbid states of wounds, are all dealt with at considerable length, and in an admirable manner. Under the heading of antiseptic materials used in the treatment of wounds no less than eighty different substances are described. Not only is every possible form of dressing described, but in special sections the best mode of treating wounds of individual parts is fully discussed. The author accepts the expression antiseptic treatment in its very widest sense.

*Die Verwerthung der Bacteriologie in der klinischen Diagnostik*, by DR. GOTTSTEIN (Berlin, 1887). This work considers, as the title explains, the part played by bacteriology in clinical diagnosis. It does not profess to be an original work, but rather a summary and review of our present knowledge of this subject. Such a manual is of great value to the busy physician or surgeon, as it presents a crude and unwieldy mass of material in an assimilable form. The following are the main affections dealt with: typhus, cholera, erysipelas, tuberculosis, leprosy, pneumonia, rhinoscleroma, syphilis, gonorrhœa, suppuration, anthrax, malignant œdema, actinomycosis.

*Diagnostik der chirurgischen Krankheiten*, by PROF. ALBERT (Vienna, 1887). This is the fourth edition of a well-known work on surgical diagnosis. It has been added to, and brought well up to date. The book forms a most admirable elementary text-book. It is short and concise. It does not cover the whole field of surgical diagnosis, but deals with the most conspicuous difficulties that come in the way of the learner. The manual would be of greater value if it were better illustrated.

*Herniologische Streitfragen*, by PROF. W. ROSER (Marburg, 1887). This little work on "Disputed points connected with Hernia," will be read with great interest by surgeons, especially by those who are acquainted with Prof. Roser's masterly contribution to surgery. The points discussed, and the general character of the work, may be illustrated by the following headings: A hernia does not form suddenly. Corpulence as a cause of hernia. Formation of a hernial sac by local stretching of the peritoneum. The constricting cause in strangulation. Venous engorgement and arterial arrest in the strangulated loop. Partial hernia. Pseudo-strangulation. Whence comes the fluid in the hernial sac? Radical operation.

*Handbuch der Massage*, by DR. HUNERFAUTH (Leipzig, 1887). This very complete and exhaustive treatise upon massage forms an important addition to modern medical literature. The author enters fully into the physiology of the measure, and into the precise details attending its employment. So far as surgery is concerned massage is dealt with in connection with the following affections: Joint affections of all kinds. Fractures, lumbago, muscular rheumatism, hernia, scrofulous gland diseases, varices, flatfoot, hypertrophy of the prostate, and some other diseases. It is to be hoped that an edition of the book will appear in English.

*Pratique de la Chirurgie des voies urinaires*, by DR. DELEFOSSE (Paris, 1887). This is the second edition of a fairly well-known work upon genito-urinary surgery. The section on the anatomy of the parts is good, although the author, like most French surgeons, ascribes wonderful properties to "Wilson's muscle." The chapter on catheterism is verbose. The section on the treatment of stricture deals largely with instruments, and gives especial prominence to internal urethrotomy. Little or no mention is made of the work of English surgeons. The work would be quite out of date but for that in an appendix some account is given of litholapaxy, suprapubic lithotomy, and the treatment of vesical tumors.

*Ueber maligne Neurome*, by DR. KRAUSE, is the last surgical contribution to *Volkmann's Sammlung*. It forms a very complete monograph upon malignant or rapidly growing tumors of nerves, dealing with sarcomatous and myxomatous neuromata. The author gives some illustrative cases and abstracts of a number of recorded examples. He makes a special point of the new formations of nerve fibres that are occasionally found in these growths.

*Fragments de chirurgie contemporaines*, by DR. BRISAY (Paris, 1887). This book consists of a sketch of what the author saw in the department of surgery during a scientific tour. It concerns itself mainly with operative gynecology. The book is well illustrated, but it is fragmentary, purposeless, and unreliable, and admirably adapted for "private circulation only."

*Étude sur les Kystes Hydatiques du Rein*, by JULES BÖCKEL (Paris, 1887). This forms a very valuable monograph upon hydatid cysts of the kidney. The author deals with the subject in a very complete manner, discussing the etiology, the clinical aspect, and the surgical treatment of the disease. The work is illustrated by a number of instructive and well-recorded cases. It forms an important addition to the literature of renal surgery.

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#### ABDOMINAL SECTION.

SIR WILLIAM MACCORMAC (*Lancet*, May 7, 1887) in an eminently practical lecture reviews the subject of laparotomy for wound or rupture of the intestines. Only two new cases are recorded, one, a patient under the care of Mr. Croft, in whom laparotomy was performed eighteen hours after a severe crush of the abdomen. A large wound was found in the ileum with a rupture of the mesentery and omentum, septic peritonitis being already present. An artificial anus was made, the peritoneal cavity being thoroughly cleansed. Four weeks later an attempt was made to close the artificial anus, the ends being resected and Lembert's sutures being employed. The patient, who was already much enfeebled, survived the protracted operation only a few hours.

In the second case, one of bullet wound, the abdomen was opened and the intestine found to be perforated, but the wound could not be closed.

M. FENILLON (*Gazette des Hôpitaux*, June, 1887) performed abdominal section in three cases of pelvic abscess in women, "suturing the abscess wall to the edges of the wound," in two with a very good result. In the third case the abscess had already burst, producing acute general peritonitis, to which the patient succumbed.

The subject and statistics of *gastro-enterostomy* are treated with characteristic German verbosity in a long article by DR. ROCKWITZ in the *Deutscher Zeitschrift für Chirurgie* for June 22, 1887, who has collected details of 22 cases, performed either for carcinoma or stricture about the pylorus, and the following is an analysis of the final results. 2 cases appear to have been completely cured (both were performed for simple stricture), 5 others were living at periods of from one to seven months. 4 other cases were claimed as recoveries, but all of these died within a few weeks or months from the operation of recurrence or marasmus. In the remaining 11 (50 per cent.) the operation may be credited with having greatly hastened the patient's death. A certain number of unsuccessful gastro-enterostomies which have



been published in America and England are not included—in fact, could the real truth be known the statistics of this operation would probably be considerably worse than Dr. Rockwitz makes them appear.

Two cases of successful abdominal section for acute intestinal obstruction are reported in the *British Medical Journal* of May 21, 1887. In the first (by MR. WILLIAMSON, of Newcastle) several adhesions and two constricting bands were liberated, in the second (by C. STONHAM), recent peritonitis was found, and the obstruction was believed to be due to a volvulus of the small intestine which was untwisted at the time of operation.

The value of Kussmaul's plan of washing out the stomach in cases of operation for strangulated hernia and intestinal obstruction is warmly endorsed by DR. REHN (*Centrablatt für Chirurgie*, July 23, 1887), who observed its effects whilst the operation was in progress and the abdominal cavity opened. The two cases (obstruction hernia and obstruction from a diverticulum band), unfortunately, ended fatally, but the relief of distention, both of the stomach and intestine by the washing out, was extremely marked and greatly facilitated the operations.

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#### THE TREATMENT OF INTUSSUSCEPTION.

MR. BARKER (*Lancet*, May 14, 1887) in a case of intussusception of the rectum, due to adenoid epithelioma of that part of the gut, succeeded in drawing down and excising the whole of the affected area after returning the two layers of intestinal wall together. The patient made a good recovery. Three similar cases had been previously operated on (two by Verneuil, and one by Hulenkampff), only one of them recovering.

A fatal case of abdominal section for intussusception in a child was reported by MR. DENT in the *Lancet* of May 21, 1887. The bowel was reduced with some difficulty, but peritonitis had set in before the operation. A similar case is recorded by MR. KNAGGS in the *Lancet* of June 4 and 11, 1887, and the risk attending forcible inflation illustrated by the quotation of eight cases in which it led to rupture of the intestine. Mr. Knaggs's paper includes a summary of eight successful abdominal sections for intussusception and twenty-nine unsuccessful ones. Although this list includes several not previously published, it is probably far from complete. The writer strongly endorses Mr. Trever's teaching as to the advisability of early operation if inflation fail to relieve.

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#### RESECTIONS AND AMPUTATIONS.

DUMONT (*Archiv für klinische Chirurgie*, Bd. xxxiv., Heft 2, p. 318) reports five cases of resection of the ankle-joint (including in one case removal of the astragalus and part of the os calcis) successfully carried out by a single external incision, convex downward. All the patients recovered with useful limbs.

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#### FRACTURES AND DISLOCATIONS.

The occurrence of a true intertrochanteric fracture of the femur and the possibility of its exact diagnosis during life was proved by a case under M. HENNEQUIN, recorded in the *Bull. de la Soc. Anat.* for July, 1887. Such

fractures, detaching the head and great trochanter from the rest of the bone, are distinguished from ordinary extracapsular fractures by the non-impaction, and from fracture below the trochanters by noting the exact level of the angle of bone below Poupert's ligament, but it is obvious that the latter is a very difficult point of diagnosis.

#### CHARCOT'S JOINT DISEASE.

PROF. SONNENBURG introduced a discussion on this subject at the German Congress of 1887 (*Centralblatt für Chirurgie*, No. 25). Whilst various opinions were held as to the pathology of the disease, nothing positive appears to have been added to our knowledge; however, a novel method of treatment was illustrated by specimens from four cases in which the affected joint had been excised. Although the results of the operation seem to have been fairly good, it may be doubted whether (considering the advanced age of the patients) a severe operation like excision is warranted in cases of joint disease from ataxia.

PROF. WESTPHAL (*Ibid.*, May 28, 1887) has traced degeneration of nerves in a case of Charcot's disease into the small branches entering the joints, as well as into the one running with the nutrient artery piercing the tibia. JÜRGENS (*Ibid.*) states that he has found pathological changes (relaxation of ligaments and congestion) in all the large joints from cases of tabes, but that similar changes were also noticed in certain cases of mental disease, chorea, etc.

#### OPERATIONS ON THE KIDNEYS AND BLADDER.

A. EDEL reports in the *Archiv für klin. Chir.*, Bd. xxxiv. p. 423, a case of nephrectomy for renal suppuration, presenting unusual complications. The patient, a man aged thirty-nine, had for many years suffered from renal colic, and finally presented the symptoms of localized peritonitis on the left side, leading to an abscess in the inguinal region and scrotum. This was drained, but was followed by an abscess in the lung, and the pus became urinous. Nephrectomy, with free drainage, was followed by temporary improvement, but then the case relapsed, and further exploration led to the discovery of a third abscess, under the diaphragm, communicating, like the others, with the suppurating kidney. Ultimately, the cavity granulated up, and the patient recovered.

KOCH, in *Brun's Beiträge zur klin. Chir.*, Bd. ii. Heft 3, records three cases of removal of vesical papilloma, two by the suprapubic incision, one after dilatation of the urethra (in a woman). The latter presented a recurrence at the end of two years; the other two remained well. Koch recommends a perineal cystotomy in cases of doubtful diagnosis, but wisely claims for the suprapubic operation alone the means of effecting a radical removal of the tumor. A good analysis of symptoms and record of previous cases is appended to the paper.

E. DE PAOLI (*Turin Medical Journal*) also reports a successful case of removal of a villous growth from the female bladder by the "high method," after the diagnosis had been completed by dilatation of the urethra.

The question of suprapubic lithotomy in children, was dealt with by F. BERESKIN, of Moscow, at this year's Russian Congress (*Centralblatt für Chir.*, No. 22, 1887). 59 operations resulted in 8 deaths, though only 3 could be

directly assigned to the operation; of 26 cases in children over five years, only one died (of scarlet fever). According to the Moscow Hospital experience, the mortality of the suprapubic method, in young subjects, was actually less than that attending the lateral operation. In two cases the peritoneum was wounded without bad effect.

Considerable discussion was held at the above Congress on the various operations for stone, but the conclusions arrived at differed but little from those of western authorities, the great advantages of litholapaxy being fully recognized, and suprapubic lithotomy again returning into favor.

M. TERRIER (*Société de Chirurgie Bull.*, April, 1887) advocates transperitoneal nephrectomy, with suture of the wound-edge to the margin of the peritoneal wound, so as to shut off the space left by the removal of the diseased kidney from the general peritoneal cavity. Two cases are recorded (one fatal), the incision being made either in the median line or the linea semilunaris. Lumbar drainage is dispensed with, although it is evident that the assistance of gravity is thus lost.

An unusual complication of suprapubic lithotomy—severe hemorrhage into the bladder some days after the operation—was reported by MR. MORGAN in the *Lancet* of May 7, 1887. The patient, a boy of six years, went on well until the fourth day, when hemorrhage occurred into the bladder and the tissues of the groin. After the clot had been washed away through a catheter he made a good recovery. The vesical wound had been sutured with catgut and a catheter left in for two days, the latter produced nephritis, and was removed. Mr. Morgan attributed the subsequent hemorrhage to distention of the bladder, owing to nephritis, and hence condemns the retention of the catheter after the operation, at any rate in children.

MR. WHITEHEAD (*Lancet*, June 18, 1887) reserves suprapubic lithotomy for cases unsuitable for either lithotrity or the lateral operation, he reports three cases in adults, one for encysted calculus, a second for a large stone ( $7\frac{1}{2}$ " in circumference), the third is a case in which no staff could be introduced. Two ended fatally from pyæmia and pneumonia, the third only recovered after a protracted and dangerous illness. It was found to be extremely difficult to recognize and open the bladder in two of the cases; in fact, in one the opening was deferred for a week. Rectal distention Mr. Whitehead regards as unnecessary and dangerous, it having been followed in the first case by severe hemorrhage and muco-purulent discharge.

It would be difficult to imagine a more unfavorable case for any form of operation than the one reported by MR. HARRISON (*Lancet*, June 18, 1887). The patient, a man aged fifty-six, of very feeble condition, had a long and tight stricture, a false passage, calculi in both bladder and urethra, with incontinence of urine. The stricture was divulsed so that a staff could be passed, on this the floor of the urethra was freely divided, a calculus removed, and then, with the finger as a guide, the prostate was incised along its floor with a curved bistoury. Two calculi were now removed from the bladder, and a drainage tube left in the wound for three days. Apart from the fact that the perineal opening would probably be permanent, the patient made a very good recovery. In advocating for certain cases a median lithotomy, with free division of the prostatic urethra, Mr. Harrison in no way dissuades from the lateral operation, which he has performed over a hundred times. At the same time he



claims for his modification (which was employed by Frère Côme in the last century) that it assimilates the median to the lateral operation in many respects, whilst being free from the risks of hemorrhage, and of bruising the prostatic tissues. Whether any permanent injury to the ejaculatory ducts, etc., is liable to follow, must at present remain an open question; nor is it certain that the operation would be free from the subsequent occurrence of incontinence of urine, which is such a distressing sequence of lateral lithotomy, and one more common than is, perhaps, generally believed.

A fatal case of suprapubic lithotomy in a child was reported by MR. GREENWOOD (*Lancet*, June 11, 1887). The case went on well for nearly three weeks, and then died suddenly, no cause being found at the post-mortem examination. Isolated cases of this operation will be found in the *British Medical Journal* of July 16, 1887 (adult female, good result). The same journal for July 2, 1887 (child aged nine, recovery from operation, but death six months later from broncho-pneumonia); *British Medical Journal* of June 18, 1887 (lad aged nineteen, bladder wound sutured, no urine escaped through it subsequently).

Two further cases of vesical papilloma removed through a suprapubic incision, are reported by SIR HENRY THOMPSON (*British Medical Journal*, June 11, 1887), both with a successful result. In one the diagnosis was effected through the discovery of typical papillomatous fragments in the urine, in the other by a perineal exploratory operation. The writer points out that in cases of non-malignant vesical growth, painless intermittent attacks of hemorrhage are among the earliest symptoms, then frequent micturition comes on, and finally, more or less continuous bleeding. As regards the operation, he is not in favor of suturing the bladder wound, but closes the greater part of the abdominal one, leaving a tube in the lower part for two or three days.

MR. EDMUND OWEN (*Lancet*, June 25, 1887) reports a successful case of abdominal nephrectomy for cystic disease of the kidney, no drainage tube being used.

MR. IMLACH (*Brit. Med. Journal*, July 2, 1887) performed abdominal section for what was suspected to be an ovarian tumor; it proved to be a case of hydatid cyst of the left kidney. After removal of the daughter-cysts the main one was sutured to the edges of the abdominal wall and free drainage provided for. The patient made a good recovery.

MR. R. J. GODLEE reported to the Clinical Society (*Brit. Med. Journal*, May 21, 1887) a case of nephrectomy in a child after rupture of an ureter and subsequent formation of a cyst containing urine. The case did well but for the fact that a sinus still remained. In another case a large cyst developed in the abdomen of a boy after a severe injury; it was opened in the middle line, the walls sutured to the edges of the abdominal wound, a good recovery ensuing. In a third case a cyst in one lumbar region (also after injury) was tapped through the seventh intercostal space. The fluid in both these cases contained urea, in one to a large amount, but it was pointed out in the subsequent discussion that this fact did not suffice to assign the cysts to a renal origin.

#### TUMORS.

The idea that the infective properties of new growths might be due to microorganisms has naturally, of late, attracted some pathologists, but the

series of experiments by Messrs. SHATTOCK and BALLANCE (*Path. Society*, May 17, 1887) give no support to this view. Using various nutrient materials, pieces of sarcoma, epithelioma, etc., were "cultivated," but the results were entirely negative. It was incidentally confirmed by the investigators that the normal tissues of the viscera are wholly free from microorganisms, so long as care is taken, in experimenting, to exclude accidental contamination.

Three elaborate papers on tumors are to be found in the *Deutsche Zeitschrift für Chirurgie*, Band 25, Heft 4 and 5. The first, by DR. FISCHER, records a case of primary melanosis of the penis, and goes fully into the literature of the subject. The second, on the prognosis, etc., of scirrhus of the breast, by DR. HILDEBRAND, is a valuable contribution to the statistics of the operation of excision. The third, by DR. WASSERMANN, treats of the various sarcomata, or "connective-tissue growths" met with about the head, being founded on a large number of cases observed at the Heidelberg clinic. In the *Archiv für klinische Chirurgie*, Band 35, Heft 2, is another careful compilation of cases of melanotic sarcomata occurring in various parts of the body. Although hardly of a nature to allow of abstracting, these monographs can be warmly recommended to those interested in the subject of malignant growths.

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#### OPERATIONS ON THE GALL-BLADDER, ETC.

MR. PAGE (*Lancet*, June 25, 1885) performed cholecystotomy in a case of distended gall-bladder; a calculus was removed from the cystic duct with lithotomy forceps, as well as two smaller ones. The walls of the cyst were stitched to the wound-edges and a drainage tube inserted, the wound entirely closing in five weeks.

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#### DUPUYTREN'S CONTRACTION.

PROF. KOCHER makes an interesting contribution to the study of this disease in the *Centralblatt für Chirurgie* for June 25 and July 2, 1887. Four cases treated by simple incision of the affected part of the palmar fascia, after fully cupping it by Esmarch's bloodless method, are given in detail. The results were very satisfactory, and tended to disprove the view held by some that the skin is concerned in the production of the deformity. Primary union of the wound followed in three of the four cases, no drainage being provided for. A detailed examination of the incised pieces of aponeurosis showed that there was a cellular thickening in the vessel-walls, together with multiplication of the connective-tissue cells—in short, that the process was one of a diffuse chronic inflammatory nature. Whether there was any cell-exudation or not was considered doubtful. The family tendency toward Dupuytren's contraction was well illustrated by one case, the patient's brother, father, and one uncle having all been affected in the same manner.

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#### DISEASES OF THE JAWS.

In a series of lectures published in detail with illustrations in the *British Medical Journal* for June and July, 1887, MR. CHRISTOPHER HEATH deals with a subject of which he has long made a special study. The various tumors affecting the maxillæ and the deformities of the mouth are fully de-

scribed, and the operations for their relief illustrated by a number of cases. To those interested in the subject, Mr. Heath's lectures will be found to contain much valuable material.

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#### MERCURIAL INJECTIONS IN SYPHILIS.

M. MARTINEAU's communication on this subject deserves attention owing to his very large experience, for he has since 1881 treated no less than six thousand patients by this method—*i. e.*, the injection of a peptonate of mercury into the back. Each patient on an average received thirty injections, and subsequently underwent a short course of mercury taken by the mouth. According to the author, the injection plan is by far the most rapid in its results, and is practically free from any risk of causing stomatitis, etc.

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#### "HAMMER-TOE."

A discussion on the curious deformity of the first interphalangeal joint known as "hammer-toe" took place at the Clinical Society (see *British Med. Journal*, June 4, 1887). MR. ANDERSON showed a case in which he had incised the head of the proximal bone with good result. The tendency of the deformity to occur in families was emphasized, and its pathology ascribed to contraction of the plantar fibres of the lateral ligaments and of the glenoid plates. In a debate on the same subject at the Société de Chirurgie (*Bulletin*, April, 1887) MM. TERRIER, VERNEUIL, and LANNELONGUE advocated incision of the affected joint in preference to amputation. There is no doubt, whatever view be held as to the pathology, that tenotomy of the flexor tendon is quite useless.

Several writers (MESSRS. HOWARD, MARSH, LUCY) have lately called attention in the *British Med. Journal* for May, to a chronic form of arthritis affecting the great toe-joint (metatarso-phalangeal), and occurring almost exclusively in young men. It produces considerable pain and rigidity in the joint, and tends to gradual recovery with some stiffening. Whilst nothing very new was brought out in the discussion as to the pathology or treatment, it was shown that many of the cases are coincident with flat-foot, others, perhaps, being due to inherited tendency to joint-disease.

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#### CLEFT PALATE.

M. LE BEC (*Gaz. des Hôpitaux*, April 26, 1887) in a case of cleft palate with wide aperture performed an operation advised by M. Lannelongue, detaching a flap from the side of the vomer and bringing it down to the palate. The result was not encouraging, owing to the extreme retraction of the flap, and would not appear to be worth imitation.

Long papers on the anatomy of cleft palate have appeared in the recent numbers of the *Bulletin de la Soc. Anatomique*. The author, M. BROCA, has examined a large number of specimens with reference to the doubt lately thrown by M. Albrecht on views first suggested by Grœthe. He confirms M. Albrecht's observations that in a considerable proportion the cleft does not pass between the incisors and canine teeth, although in some it does. Further, there are frequently three incisors developed on one or both sides, and the cleft, if present, will probably pass between the two central and the lateral



incisor. M. Broca's work is very detailed, but unfortunately is poorly illustrated.

Another contribution to the subject of "Cleft Palate and Fissures of the Face" is by DR. MORIAN in the *Archiv für klinische Chirurgie*, Band 35, Heft 2. It is, however, of purely pathological interest.

#### SYNOVIAL CYSTS IN THE NEIGHBORHOOD OF THE KNEE.

A case of multiple cysts on all sides of the knee-joint in a man of fifty-three of rheumatic tendencies, is reported by MR. MAYO ROBSON in the *Lancet* of July 16, 1887. M. POINIER has been investigating the subject and has from a large number of specimens arrived at the conclusion, that in practically every case the cysts owe their origin to distention of diverticula from the joint. Sometimes they become shut off from the articulation, but careful dissection will even then reveal traces of the previous communication. M. Poinier's papers are to be found in the recent numbers of *Bull. de la Soc. Anatomique*. MR. MORRANT BAKER has arrived at much the same conclusions, and both writers attribute to rheumatic arthritis a large share in the production of the diverticula.

#### SURGICAL DRESSINGS.

VON MOSETIG MOORHOF strongly recommends an occlusive dressing of iodoform gauze and wool in the case of burns and scalds, gutta-percha tissue being applied astride the iodoform dressing. Under favorable circumstances the dressing may be left for a week or more before changing it; whilst in other cases it is best to apply fresh iodoform-vaseline daily. He has not seen any toxic effects—but the possibility of their occurrence should be borne in mind.—*Wiener med. Presse*, 1887, Nos. 2 and 3.

DE RUYTER (German Surgical Congress, 1887), SENGER and others have to a certain extent vindicated the antiseptic properties of iodoform from the recent attacks of Danish investigators (Heyn and Rovsing in the *Fortschritte der Medicin*). Whilst confirming the fact that iodoform has practically no action on germ-life, etc., outside the body, De Ruyter showed that in the presence of ptomaines the drug is decomposed and has a powerful antiseptic effect. PROF. P. BRUNS (*Ibid*) has treated over fifty cases of cold abscess with iodoform injections (ten per cent. of iodoform mixed with equal parts of alcohol and glycerine) and speaks as favorably of the method as does M. Verneuil, of Paris. He claims for the drug a direct effect upon the tubercle-bacilli.

#### A NEW OPERATING TABLE.

DR. HAGEDORN, of Magdeburg, to whom the profession is already indebted for introducing several improvements in surgical instruments, has lately devised an operating table especially adapted for antiseptic irrigation during the course of the operation. It is figured and described in the *Centralblatt für Chirurgie*, July 9, 1887, and its chief feature is a median gutter or trench, toward which on either side the surface of the table is made to slope. The table is covered with India-rubber, and the fluid running into the trench is

conveyed by a pipe into a vessel placed beneath. The ease with which the whole can be disinfected is an obvious recommendation.

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#### INJURIES OF NERVES.

MR. A. BOWLBY (*Lancet*, May and June, 1887), in an interesting course of lectures at the Royal College of Surgeons, described the pathology and treatment of injuries to nerves, and the modes of reunion. They should be consulted as giving a full account of the present state of our knowledge on the subject. Mr. Bowlby supported the "trophic influence" view, gave examples of rapid restoration of function after primary reunion of nerves (an interesting case of which, reported by M. POLAILLON, was discussed at the Société de Chirurgie on May 25, and June 10, 1887), and went fully into the subject of "supplementary sensation" after division of a nerve due to communication of its branches with those of adjoining nerves.

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#### MYCOSIS FUNGOIDES.

According to some writers on this rare disease some cases are capable of complete absorption or resolution of the new-growth, thus sharply distinguishing the latter from the class of sarcomata. H. HÖBNER (*Deutsche medicinische Wochenschrift*, 1886, Nos. 39 and 40) describes one case in which the multiple tumors disappeared under arsenical treatment, he also gives another in which the usual fatal result followed from pneumonia and nephritis. Very careful research for a microorganism in the new-growths or the viscera was attended with only negative results. According to HOCHSINGER and SCHIFF (*Vierteljahrschrift für Dermat. und Syphilis*, 1886, p. 361), who report a third case, streptococci were found in the vessels, but their significance appear doubtful.

Four stages are described in the course of this peculiar disease: 1, erythematous or eczematous patches on the skin; 2, small lichenoid elevations; 3, large moist tuberous elevations; and 4, general cachexia.

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#### DISEASES OF THE RECTUM.

The usual treatment of stricture of the rectum by dilatation is, as a rule, so painful and often so unsatisfactory that were electrolysis an efficient substitute it would be gladly welcomed. The case recorded by MR. WHITEHEAD (*British Medical Journal*, July 2, 1887) is not very encouraging, as after a thorough trial of electrolysis the stricture was found to be as tight as before. It may be mentioned that Mr. Whitehead discredits the theory of the origin of fibrous stricture of the rectum from pelvic cellulitis or injury in childbirth, and believes that it is nearly always due to a venereal cause.

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#### ŒSOPHAGOTOMY.

DR. G. FISCHER records the successful removal of an eyeglass which had become impacted just below the cricoid cartilage, the patient, a young man of sixteen. The use of forceps was unavailing, so the œsophagus was opened on the left side in the usual manner. The wound in it was closed with catgut,

an India-rubber tube employed for giving fluid food, and the progress was one of uninterrupted recovery. An analysis of eighty recorded cases (sixty successful) of œsophagotomy for foreign bodies is appended. Another is added by MR. BENNETT MAY, in the *British Medical Journal* for May 21, 1887, and presents several points of interest. A child, aged four years, had swallowed a half penny which remained impacted just below the top of the sternum for three years, during which time he had become so emaciated from dysphagia as to be unfit for any operation. By means of a catheter, which was introduced past the obstruction with much difficulty, fluid nutriment was conveyed into the stomach, and as soon as his general condition had sufficiently improved œsophagotomy was performed in the usual manner. Considerable force was required to remove the coin, and a rush of air showed that a communication existed with the trachea or a bronchus. Nutrient enemata were tried for four days, but the patient's condition then compelled a resort to feeding by the œsophagus. The regurgitation of fluids through the wound delayed healing, which, however, speedily occurred after an India-rubber tube had been passed through the mouth. With the exception of an attack of intestinal obstruction, due to impacted feces, the subsequent recovery was almost uncomplicated.

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#### HYDATID CYSTS.

A singular complication of an hydatid cyst in the neck occurred in a girl under the care of DR. GARDNER, of Adelaide (*Brit. Med. Journ.*, July 16, 1887). In the belief that the tumor was composed of caseating glands it was cut down upon, and after evacuating the cyst the latter was found to extend downward into the thorax. Severe hemorrhage occurred on two occasions subsequently, proving fatal. The subclavian artery was found to be eroded in its first part, so that the vertebral and inferior thyroid arteries were detached from the main trunk.

Several cases of severe collapse attending the aspiration of hydatid cysts have been lately recorded, one by DR. THOMAS, of Adelaide (*Brit. Med. Journ.*, May 21, 1887). In this case the cyst was large, and was diagnosed as of splenic origin. Only three ounces were withdrawn, but syncope rapidly came on, and lasted several hours. The patient eventually rallied under the hypodermatic administration of ether. It seems probable that in such cases the absorption of a poison contained in the cyst-fluid accounts for the symptoms, although it is well known that similar phenomena occasionally follow the aspiration of simple pleuritic effusions.

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#### HYDROPHOBIA.

In June, of this year, the report of the English Commission on M. Pasteur's method of inoculation was presented to the House of Commons, and, speaking generally, it may be said to confirm in all important points the claims made by the great French savant. Experiments made on animals by Mr. Victor Horsley showed that M. Pasteur's preventive inoculations provided a complete protection, while careful analysis of the cases treated in Paris, which was made by Professor Sanderson and Dr. Brunton, pointed strongly to a similar protection being afforded in the human subject. At the same time



the "intensive method" appeared to have, in more than one instance, directly led to a fatal issue, and M. Pasteur has since modified this form of inoculation. On the other hand, Prof. von Fritsch (*Die Behandlung der Wuthkrankheit*, etc., Vienna, 1887) has, after a careful series of experiments in Paris and Vienna, failed to verify M. Pasteur's conclusions in several important respects. Thus, in rabbits and dogs, submitted to subdural infection after undergoing a series of preventive inoculations, a large proportion, if not all, succumbed to rabies. Even the "intensive method" was of no avail in the majority of instances. So that, at present, the statements of Dr. Fritsch and Mr. Horsley are in direct contradiction with each other.

The following papers are especially worthy of notice amongst those which have been published during the last three months:

*Aëro-Urethroscopy*, by DR. G. VON ANTAL (*Centralblatt für Chir.*, May 14, 1887). By means of India-rubber bags connected with the endoscope the urethra is distended with air so as to facilitate the examination of its wall.

*Necrosis of the Aural Labyrinth and Paralysis of the Facial Nerve*, by F. BIZOLD (*Zeitschrift für Ohrenheilkunde*, Band xvi.). Details of 41 cases are given, 28 complicated by facial paralysis. The importance of removal of the sequestrum, as soon as practicable, is dwelt upon, and the various symptoms dealt with in detail. Disturbances of equilibrium are rarely observed.

*Case of Perforating Ulcer of the Duodenum*, by A. DUTIL (*Bull. de la Soc. Anat.*, July 1, 1887). This case was interesting surgically, inasmuch as the symptoms closely resembled those of internal strangulation.

*Study of the Fractures of the Upper End of the Humerus*, by DR. HENNEQUIN (*Revue de Chirurgie*, June, 1887).

*Tertiary Syphilitic Affections of the External Genitals*, by CH. MAURIAC (*Annales de dermat. et syph.*, 1887, Nos. 1 and 2). The author gives details of 26 cases, well illustrating the difficulty which frequently attends their diagnosis from primary chancres, etc.

*The Treatment of Syphilis by Tannate of Mercury*, by C. SCHADECK (*St. Petersburger med. Wochenschrift*, 1887, No. 6). The writer does not claim for this drug any great superiority over the other preparations of mercury, but states that, as a rule, it is less liable to produce salivation.

*Spina Bifida Occulta*, by J. B. SUTTON (*Lancet*, July 2, 1887). A short lecture on the curious overgrowth of hair occurring over the site of defective spinal arches. Six examples are referred to, it is interesting that in two there was a "perforating ulcer of the foot," and clubfoot has also been noticed, although there is, in some cases, no sign of the abnormality in later life except hypertrichosis (usually in the lumbo-sacral region).

*Case of Cerebral Abscess following Empyema. Unsuccessful Trephining*, by DR. DRUMMOND (*Lancet*, July 2, 1887). In this case the abscess was situated in the upper part of the ascending frontal lobe, the trephine being applied over the lower. The case is well recorded, and merits careful perusal.

*Strangulated Hernia complicated by Suppurative Peritonitis. Operation. Recovery.* DR. J. BRAMWELL (*Brit. Med. Journ.*, July 16, 1887).

*Incision of the Larynx.* DR. GARDNER, of Adelaide (*Lancet*, May 7, 1887). In this case, one of epithelioma, in a man of sixty years, the operation was recovered from, but the growth returned within four months.

*The Radical Cure of Hernia by Injection*, by C. B. HUTLEY (*Brit. Med. Journ.*, May 21, 1887). One case of double hernia, operated on by the writer, has proved a perfect success, having stood the test of time; the two reported in detail only showed that, although severe inflammatory reaction might be produced by the injection (decoction of oak-bark, glycerite of tannic acid, etc.), no curative effect was produced on the hernia.

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## IN AMERICA.

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### EXCISION OF THE LARYNX AND PHARYNX.

DR. D. HAYES AGNEW reports in *The Medical News* of April 9, 1887, an operation of this kind on a man, fifty-eight years old, for the removal of a sarcomatous growth as it was considered before operation, but which proved to be a tubular epithelioma. Recognized laryngoscopically by Drs. J. Solis Cohen and C. Seiler to extend down to, but not below the vocal cords, excision of the larynx was advised and performed February 2, 1887, at the University Hospital. After the larynx had been removed the pharynx was seen to be so much involved as to demand its extirpation, "saving a very narrow strip of its posterior wall." The secretions of the mouth and fauces threatening infiltration of the mediastinum by working through the loose tracheal fascia, an aseptic sponge plug, frequently changed, was placed in the fauces. The trachea was plugged with a perforated rubber cork, "through which was passed a siphon tube," its outer orifice being kept covered with antiseptic gauze. The operation was antiseptic throughout. Death occurred on the fourth day, but owing to the absence of a post-mortem examination it is doubtful whether this result was due to heart failure, sepsis, or pneumonia. Should he perform a similar operation Dr. Agnew says that he will certainly make a preliminary tracheotomy some time before excising the larynx.

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### MIDDLE MENINGEAL HEMORRHAGE—TREATMENT BY TREPHINING.

DR. CHARLES A. POWERS, in the *Medical Record* of June 24, 1887, reports the case of a man twenty-eight years of age, who, brought into hospital thirty-six hours previously in a comatose condition, had regained consciousness and apparently normal motility, but presented at the time of operation the following symptoms:

The pulse was 80, respiration 18, temperature 99°; the patient was perfectly rational. There was complete paralysis and anæsthesia of the left upper extremity, also a slight degree of "fluttering" on the left side of the face. The patient said he did not feel a pin-prick as acutely on the left side of the face as he did on the right. The tongue did not deviate; the right pupil was a little larger than the left; both responded to light. There was no aphasia. The scalp in the occipital and the back part of the right parietal region had a rather "pulpy feel." Serous discharge from the right ear continued, having been preceded by a moderate hemorrhage, and there was now an area of ecchymosis over the right mastoid region about the size of a silver quarter.

After locating the fissure of Rolando—by an unnecessarily complex method—a free crucial incision was made over the motor area of the arm through a “markedly congested” scalp. A fissure was found in the parietal bone running antero-posteriorly three inches from the median line of the vertex, from which blood oozed. A three-fourths of an inch trephine crown was applied over the fissure, at a point where a line drawn from the commencement of the fissure of Rolando to the external auditory meatus would intersect the fissure in the skull. Beneath the perforation was found a clot; the opening was enlarged by the rougeur until an elliptical opening three inches long and one and one-half inches wide was made. The clot was now removed by a spoon-handle, the finger, and irrigation, leaving a depression one and three quarters inches at its deepest part, and whose superficial area measured six and one-fourth inches from before backward, and three and one-half inches from above downward. The dura mater was intact, but several oozing points required ligation. The cavity was irrigated by mercuric bichloride 1 to 6000, and to facilitate drainage a counter-opening was made by a trephine-cut at the lowest point of the cavity, viz., “just above the point where the lateral sinus crosses the lambdoid suture.” A drainage tube passing through both openings, a moderate packing of the cavity with strips of iodoform gauze to check oozing, drainage secured by placing antiseptic gauze beneath the scalp wounds at all points, and a large dressing of bichloride gauze and borated cotton applied over all, completed the operation. Strict antiseptic precautions were taken.

The following morning, partial return of power and sensation was detectable in the upper extremity and face: the gauze packing was removed, and the dura mater was found “advanced about half way to the inner surface of the skull.” The following day the dura was nearly in contact with the skull. Within forty-eight hours the dura mater and skull had reunited (?) except along the drainage track and where the packing was left. Accordingly, the tube was withdrawn, a horse-hair drain substituted, and various symptoms of cerebral irritation of no special moment succeeding one another, but with a temperature never over 101°—and usually much less—on the twenty-ninth day he was walking about the ward; “rational, pulse and temperature normal, . . . functions of left arm equal to those of right.”

The remainder of the paper deals with the literature of the subject, and the diagnosis and methods of locating extravasations.

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#### TREPHINING IN A CASE OF INTER-MENINGEAL HÆMATOMA WITH HEMIPLEGIA.

DR. S. T. ARMSTRONG, in the *Journal of the American Medical Association* of June 18, 1887, reports a case in which, nearly two months after a blow from the corner of a brick, which produced a lacerated wound half an inch above the external edge of the left eyebrow without fracture of the skull, sudden slight dragging of the right foot was complained of. The next day, while at breakfast, the patient's head suddenly fell forward on the table, and the right arm and leg seemed paralyzed, but five days later, only some dragging of the right foot and occasional loss of control of the right arm and leg existed. A roaring sound in the left ear persisted from the time of injury, and hearing



was deficient on this side. Two days later, the paretic condition of the leg was more marked and that of the arm slight, but constant and undoubted. Morning chilliness was noted from the time of the first hemiplegic seizure.

The diagnosis was made of a cortical lesion affecting the middle frontal convolutions, and extending upward and backward gradually involving the ascending frontal convolution. This lesion was believed to be a septic purulent inflammation. Sixty-four days after the accident, and thirteen from the appearance of cerebral symptoms, double optic neuritis being present, trephining was done over the middle frontal convolution, and the non-pulsatile, dark-colored dura mater was punctured with the needle of a large hypodermatic syringe, upon drawing up the piston of which, the instrument was filled with dark brown blood, a similar fluid flowed from the needle puncture, which was slightly enlarged, giving vent to much more brownish fluid blood. Four strands of aseptic horsehair were passed through the dural opening, and boracic acid applied to the wound with absorbent cotton and a bandage. By the evening of the day of operation control over the right arm and leg had been regained. On the eighth day, he could walk with "undiminished muscular control," and rapidly recovered.

In regard to finding blood instead of pus, this corroborated the dictum of Nancrede (*International Cyclopaedia of Surgery*, vol. v. p. 50): "A differential diagnosis can, under the most favorable circumstances, be only probable and is in most instances impossible." The literature of the subject is thoroughly reviewed.

#### LAPAROTOMY FOR PERFORATION OF THE APPENDIX VERMIFORMIS.

DR. R. F. WEIR, in an elaborate paper in the *Medical Record* of June 11, 1887, treats the whole subject exhaustively. Dr. Weir states that death occurs within the first five days in 34 per cent. of adults according to Fitz, and in 70 per cent. of children, while 44 per cent. of these deaths take place within the first three days according to Matherstock.

In consideration of these data, it seems to him justifiable to urge the necessity of opening all inflammatory swellings of the right iliac region as early as possible. If from too great tenderness palpation is interfered with, and exploration with a good-sized aspirator needle carried in several directions into the lumbar region, as well as deep into the iliac fossa reveals no pus, anæsthesia should be induced, and a conjoined abdominal and rectal examination be *gently* made. "If a tumor be made out, in such circumstances, the use of an exploratory incision running as if for ligature of the external iliac artery, or, . . . one starting two inches in front of the longissimus dorsi muscle and running forward just above the iliac crest, can be resorted to until the swelling is reached, when either aspiration can again be used or the tumor can be directly incised." The author's recapitulation is as follows:

1. That the generality of perityphlitic abscesses are due to inflammation or perforation of the appendix vermiformis.
2. That the mortality in such lesions is greatest prior to the third day.
3. That as soon as it can be recognized, pus should be evacuated extra-peritoneally, if possible, or by a lateral laparotomy, and the cavity drained.
4. That if aspiration fails to detect pus where a tumor exists, it is wiser to make an early extra-peritoneal exploratory incision.

5. That where general peritonitis is progressing with any history of a right iliac pain, a limited lateral (preferable) or a median laparotomy should be made, to explore the region of the appendix within forty-eight hours from the inception of the disease.

6. That if pus is thus recognized, it should be evacuated and a drainage tube inserted without toilet of the peritoneum.

#### LAPAROTOMY FOR PERFORATING PISTOL-SHOT WOUND OF THE ABDOMEN.

DR. J. I. SKELLEY, in the *Annals of Surgery* for July, 1887, reports a case in which after section no wound of any viscus was detected, but the ball and blood having been removed, and a bleeding point in the ball-track, from which blood was flowing into the abdomen, having been secured, all pain and shock ceased. The peritoneum, linea alba, and skin were separately sutured with catgut, and iodoform used, perfect union resulting in one week's time. There was no rise of temperature at any time. Under disadvantageous circumstances strict asepsis was secured, and the important surgical fact demonstrated that even without visceral penetration laparotomy is the best treatment for penetrating abdominal ball-wounds.

#### SPLENECTOMY.

DR. J. W. LEONARD in *The Medical News* of August 13, 1887, reports for the operator, Dr. James McCann, a case of this rare operation upon a female patient, æt. twenty-nine years. The tumor had been noticed for six years, but her health had been good except apparently as a consequence of three miscarriages, until some time in 1882, two months before her last miscarriage, when she had her first attack of hæmatemesis, followed by seven others up to March, 1886, inclusive. These attacks came on with great suddenness, were of most alarming severity, and the only premonitory symptoms were drowsiness and general malaise. These hemorrhages were only arrested by syncope, until the patient, on her admission to the Pittsburg Hospital, on May 6, 1886, presented all the symptoms of most profound anæmia.

Physical exploration of the abdomen revealed the presence of an extremely mobile tumor occupying the left iliac, and extending to the suprapubic region. "Its surface was flat and smooth, contour well defined, of oblong or roundish shape; dimensions four by five inches; consistency more than semi-solid; percussion note dull, and the auscultatory signs were negative."

The tumor rapidly increased in size for a short time after its first appearance, but for a year it had remained stationary, "except just before a hemorrhage, when it would become considerably enlarged," and then would pulsate violently. There was abnormal resonance over the splenic area. After improvement of her general health by tonics, etc., on May 27, 1886, median laparotomy by a five inch incision was done, and the spleen was removed after separating a broad and firmly adherent portion of omentum. During these manipulations the spleen was ruptured, resulting in profuse hemorrhage, which was promptly arrested by the pressure of an assistant's hand. Full Listerian precautions were employed, even to the use of the spray. Although not more than two (?) ounces of blood was lost, the most profound shock ensued, but reaction took place after numerous hypodermatic injections of

ether and whiskey. She was discharged thirty-three days after operation. Menstruation returned, and persisted until she became pregnant, in October or November, 1886.

A table is appended, showing all the complete excisions of the spleen made since 1881, the date of Mr. Collier's paper—seventeen in all, with twelve recoveries. The reporter is sanguine as to the future applicability and success of this operation, "even in cases of hypertrophy complicated by leukæmia."

#### SUPRAPUBIC CYSTOTOMY.

DR. F. S. DENNIS, in the *Medical News* of May 28, 1887, first proves that the great changes in operative procedure now in vogue, have been brought about by dissections and experimental work on the cadaver. The modern operation only differs from that of the sixteenth century in the perfection and completeness of its details. Stress is laid upon the additional safeguard against urinary infiltration offered by the use of an antiseptic fluid, instead of ordinary water, for distending the bladder. Dr. Dennis contends that the old suprapubic operation was dropped, not on account of its danger, but because of the great *éclat* with which the perineal operations were received. So completely had this operation been disused that up to 1851 only 260 cases could be collected, and between 1851 and 1879, only a few more were reported.

Since 1879, however, it has been rapidly gaining the confidence of the profession, until Dr. Dennis thinks that Dr. Roberts' prophetic words of a few years since, have almost been realized, viz., that within ten years the suprapubic operation will be the operation adopted for all cases of stone that are not treated by Bigelow's operation. Dr. Dennis further remarks that the time is not far distant when there will be but practically two operations for stone in the bladder, the suprapubic lithotomy and litholapaxy. "It is simple in its technique, safe in its execution, radical in its results, free from injury to the reproductive organs, curative in its application, and, finally, brilliant in its statistics."

The only points as to technique we can refer to, are that no perineal drainage is needed; the catheter must not be retained for more than forty-eight hours lest traumatic urethritis result; the bladder wound in *stone cases* should be left open, while in rupture it may, and should be sewn—since here the bladder-walls are healthy. That this advice is good is proved by the fact that re-opening of the wounds occurs in two-thirds of those sutured after *stone operations*.

The special indications for exploration of the bladder by the suprapubic operation are found:

1. In cases of lithotomy for large, hard calculi; also in lithotomy occurring in a patient suffering from paraplegia, a contracted pelvis, perineal tumors, encysted calculi, ankylosis of the hip, hemorrhoids, or great obesity.
2. For the removal of certain foreign bodies as hairpins, bodkins, needles, etc., for the treatment of chronic cystitis, and for the operation for calculi in the female.
3. In lithotomy occurring in a patient with greatly enlarged prostate, or with fibroma of the prostate, or in calculi found in diverticula behind the prostate.



4. For the excision of tumors of the bladder.

5. For rupture of the bladder.

The advantages are stated to be the safe removal of large, hard stones, inoperable by any other method; the absence of risk of perineal hemorrhage, urinary infiltration, perineal fistula, laceration of rectum and neck of bladder, the prevention of traumatic stricture and cystic hemorrhage, and the avoidance of any interference with the genital apparatus.

In young women no risk of vesico-vaginal fistula exists, nor in the old, permanent urinary incontinence. It is the safest operation whatever form of renal disease exists, and the only means of saving life in rupture of the bladder. The chances of recurrence are less than after lithotrity. Suprapubic lithotomy is also free from danger during its performance. Dr. Dennis has collected 124 suprapubic lithotomies performed since 1879, of which number eighteen died. Seven of these deaths we agree with the author should be subtracted, leaving a mortality of only about nine per cent. The causes of death are chiefly secondary—*i. e.*, due to septic infection, not to the operation itself, and this mortality can probably be reduced by "more rigid antisepsis for the bladder." The author also points out that heretofore this operation has been reserved for stones of a large size, and is in consequence performed in patients much run down, so that when resorted to earlier and for smaller stones the mortality will diminish.

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#### TREATMENT OF ANAL FISSURE AND HEMORRHOIDS BY GRADUAL DILATATION.

DR. H. O. WALKER, in the *New York Medical Journal* of July 30, 1887, reports that he has treated over fifty cases of this nature with unvarying success by either the gradual dilatation by the finger or a bivalve rectal speculum. The first dilatations are slight, but repeated every three days until the instrument can be expanded to its utmost capacity. Topical treatment with tannin and glycerine, or iodoform and balsam of Peru, is mentioned as having been resorted to in some of the cases, but no stress is laid upon it. If the author is correct in his observations, it is strange that identical results have not followed the somewhat similar methods commonly in vogue. We believe the topical treatment deserves vastly more credit than Dr. Walker accords it.

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#### HORNY GROWTH OF THE PENIS.

DR. J. H. BRINTON, in *The Medical News* of August 6, 1887, records the history of a growth of this nature. The horn was one and seven-eighths of an inch long, by one and three-eighths in circumference at its base, and was curved forward, slightly tapering, and sprang from the base of the glans at the coronal border; it was firmly attached both to the glans and to the prepuce. On the dorsum, half an inch in front of the corona, a plate of horny tissue, varying in width from three-quarters of an inch to an inch, encircled the end of the glans, covering and destroying the frenum and its attachments, surrounding the meatus, and narrowing it to a pin's point. Through this narrowed opening, impervious to any instrument, the urine escaped slowly, drop by drop. Owing to the extent of disease, and the involvement of the

urethra, the glans was removed just beyond the corona. Microscopically, the growth consisted in all parts of shrivelled, closely packed squamous epithelial cells, "even more tightly united than in the structure of the living nail," except at the more interior portions, and in the lamellar plates covering the glans. Only fourteen similar cases have been put on record, but one or more are vaguely mentioned. Although occasionally coincident with, or followed by an epitheliomatous condition, they have been, in almost all instances, preceded by a wart, as in the present case. Free removal is advocated, the incisions being carried well beyond the diseased borders.

Appended are references to all recorded cases, so that this paper at a glance puts the reader in possession of all the facts with regard to this rare affection.

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#### THE CORRECTION OF "PUG-NOSE" BY A SIMPLE OPERATION.

DR. JOHN O. ROE, in the *Medical Record* of June 4, 1887, contends that this form of nose is a sign of degeneracy; that it is owing to the overgrowth of the soft parts, the result of interference with the return circulation from obstruction of the nasal passages in childhood.

After applying cocaine, the parts are illuminated, the end of the nose is turned upward and backward, the mucous membrane is dissected from those parts to which it is not too adherent, and the superfluous tissue is removed so as to allow the organ to conform to the shape we desire. Neither too much tissue must be removed nor the skin cut through. In some cases no after-treatment is required, but replacement of the dissected-up mucous membrane. In others a saddle-like splint should be moulded to the dorsum of the nose. Where the deformity is due to bulging out of the alæ from malformation of the cartilages, these must be cut through at various points with a tenotome so as to destroy their elasticity, after which a hard rubber or silver tube must be inserted into each nostril, and the "saddle" before mentioned moulded to the outside of the nose. Illustrations of successful cases are given.

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#### AMPUTATION OF THE BREAST UNDER COCAINE ANÆSTHESIA.

DR. DANIEL LEWIS, in the *Medical Record* of June 4, 1887, reports a successful operation on a patient aged seventy-eight years. Dr. Corning induced anæsthesia by his method of application of a rubber-coated ovoid iron ring around the gland, and injections into the layers of the skin of a two per cent. solution of cocaine at intervals of about one-half inch, after tracing the line of the proposed incision with iodine. Several larger injections were made beneath the tumor. No pain was felt except that from the first hypodermatic needle puncture, and the passing of the last sutures in a small section of the lower flap. Twenty-five minutes were consumed by the operation and less than three drachms of the solution was used; healing was complete in seven days.

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#### LIGATURE OF THE INTERNAL JUGULAR VEIN FOR A KNIFE-CUT.

DR. F. TIPTON, in the *New York Medical Journal* of July 2, 1887, reports a case in which the patient ran some distance, bleeding profusely; the hemorrhage was temporarily arrested by digital pressure, until a distal ligature was

passed and tied. All bleeding was arrested until, in the effort to avoid syncope, the patient's head was lowered, when fresh hemorrhage took place from the untied proximal portion of the vessel, which had been only cut half way through, not entirely severed. Elevation of the head at once and permanently arrested the recurrent bleeding. Recovery ensued, but the ligature remained attached for several months.

We are surprised that a proximal ligature was not applied as well as the distal, a rule which is almost as imperative for a *large* wounded vein as for a wounded artery.

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#### BASE-BALL PITCHER'S ARM.

DR. A. H. P. LEUF in *The Medical News* of July 16, 1887, considers this subject most exhaustively. Practically any of the muscles of the upper extremity and of the right side of the trunk may be affected, but the trouble usually commences in the brachialis anticus. In its severer forms, muscles, ligaments, cartilages, and even the osseous tissues are, in Dr. Leuf's opinion, involved.

The author's views as to prophylaxis seem sound, but as to treatment amount to little more than regular daily exercise, "to bring to a climax and final completion those congestive and inflammatory processes in the muscles, ligaments, cartilages, and bones that lead to hypertrophy and necessary increase in strength." These are certainly novel pathological views, although the practice may be good. In the more severe forms "mild galvanism," making use of large flat electrodes applied over the most sensitive points in front of and behind the affected joints, is recommended, the latter part of the day being the preferable time.

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### OPHTHALMOLOGY.

UNDER THE CHARGE OF

L. WEBSTER FOX, M.D.,

OPHTHALMIC SURGEON TO THE GERMANTOWN HOSPITAL, PHILADELPHIA.

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#### ETIOLOGY OF OCULAR PARALYSES.

In the *Recueil d'Ophthalmologie* for March, 1887, PROF. FOURNIER sets out the distinctions between the symptoms of ocular paralyses, caused by ataxia, and those from lesions of the ocular nerves. If symptomatic of tabetic disorders, he finds the following distinctive points:

1. The paralyses are almost always single or in groups, and partial; the pupil is often implicated in a peculiar manner.
2. There is either the Argyll-Robertson pupil or myosis.
3. The paralyses are often of short duration, sometimes for an instant only.
4. They are especially liable to recur, and often cease spontaneously and quickly.



If of the following characters, a lesion of the nervous system is probable:

1. If the paralysis be complete.
2. If persistent.
3. If relieved only by specific treatment, long continued.

Of 62 cases of tabetic paralysis, the author found but a single one with total paralysis of the ocular muscles. Of the 62 cases the pupil was affected in 37, of which 28 had no other muscles implicated. Of the 9 remaining cases out of the 37, in which other muscles were affected, there were 3 cases of paralysis of the levator and of the internal rectus, 2 of the levator, 2 of the internal rectus, 1 of the inferior rectus, and 1 of the levator and inferior rectus. Of the 62 cases there were 15 myoses, 11 of which were without implication of other muscles. The author emphasizes the existence of a passing strabismus or of temporary diplopia, as thus often indicative of locomotor ataxia.

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#### THE BACILLUS OF CATARRHAL CONJUNCTIVITIS.

DR. J. E. WEEKS (*Arch. f. Augenheilkunde*, xvii. 3, p. 318) describes a bacillus obtained from an acute case of catarrhal conjunctivitis, that he thinks the source of the infection. Two kinds of bacilli were found in the cultures, but the rod-like variety was proved by cultures to have no pathogenic quality. The one producing the inflammation was shorter than the tubercle bacillus, but of about the same thickness. The period of incubation after inoculation was about forty-eight hours; inoculation always produced the characteristic conjunctival symptoms, and the bacillus in every case, when there was yellowish secretion, was always present.

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#### TUBERCULOSIS OF THE CONJUNCTIVA.

In *Gräfe's Archiv*, Band xxxii. Abth. iii., DR. STÖLTING reports three cases of this serious affection, and bespeaks a more hopeful prognosis than has heretofore been considered possible, and, especially, if the treatment be commenced at an early date. The diagnosis of the disease was rendered certain, in one case by the production of the characteristic bacillus under the microscope, in the second by inoculation and proof of the existence of the bacilli in the animal, and in the third case by both methods. The tuberculous ulcers were situated respectively upon the upper lid, the cheek, and the lower lid. The single and effective therapeutic measure advocated is the complete destruction of the tuberculous centre and deposit by the thermocautery. In some cases this may have to be repeated, or more thoroughly carried out at successful periods, but in each of the three cases cited, complete success was finally attained by this means. The author cautions against unnecessary destruction of healthy adjacent tissue, such as would cause cicatricial contractions, disfigurement, etc.

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#### INJURIES OF THE EYES BY DYNAMITE.

PROFESSOR A. VON HIPPEL (*Gräfe's Archiv*, Band xxxii. Abth. iii.) describes the ocular injuries from explosions of dynamite in twenty cases that have come under his care. The most characteristic changes are in the cornea, and in all instances consist in a great number of grayish-white, punc-

tate opacities, the result of the penetration of particles of sand, stone, etc., into the more superficial or deep corneal strata. The corneal epithelium was in all cases burnt or severely injured. The most serious and frequent complication of the many that may occur is, besides the loss of superficial substance, the perforating wounds of the cornea. The sclerotic was seldom perforated. In only one instance was any considerable fragment of stone, etc., found within the globe. The more severe injuries ended in loss of the eye by panophthalmitis or irido-choroiditis. Of the twenty cases, eight became blind in both eyes, seven in one eye, the vision of the remaining eye being very bad.

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#### OCULAR INJURY BY LIGHTNING.

DR. M. KNIES (*Gräfe's Archiv*, Band xxxii. Abth. iii.) describes a case of this rare occurrence. A ten year old boy was struck with what might be called a spent bolt, while standing by an open window. He at once turned around several times slowly and in a peculiar manner, fell backward to the floor, and was unconscious for two hours. Upon the return of consciousness, both eyes, especially the right, were found much swollen and flowing with tears. The child was weak, dazed, slept a great deal, but had no headache. Four days later the oculist found fresh irregular wounds of the forehead and temple, and these extended down the right sterno-mastoid and the side of the body to the foot. The skin of the forehead was in folds from the constant contraction of the frontalis muscle. The eyebrows and lashes were burned upon both sides, and there was incomplete ptosis with ciliary injection and diffuse corneal opacity. Upon the right side there was a large posterior stellar polar cataract and further lenticular opacity from the equator to the anterior cortex. There was complete amaurosis, but a normal-sized and acting pupil. In the left eye there was beginning cataract and a normal fundus, with vision one-half, not improved by lenses. The ocular motility was not interfered with upon either side. The right cataractous lens was partially removed at a later date, but the patient passed from observation, and the final results are not to be had. Two sets of consequences are, therefore, to be distinguished: First, the direct, consisting in the burning of the lashes, the flesh wounds made by the electric stream, the injuries to the nerves or muscular tissues by the same; second, the indirect, the iritis, the irido-cyclitis, the cataracts, etc.

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#### RELATIONS OF CORNEAL CURVATURE TO CRANIAL CIRCUMFERENCE.

BOURGEOIS and TSCHERNING (*Annales d'Oculistique*, xcvi. p. 203), from the measurements of 203 soldiers, found that the radius of corneal curvature varied in proportion to the circumference of the head. Whilst the first rose from 7.78 mm. to 7.92 mm., the cranial measurements were from 54 to 60 cm.

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#### IRIDO-CYCLITIS TUBERCULOSA.

Tuberculosis of the uveal tract is a rare disease occurring not more frequently than once in about 5000 cases of ocular disease. Therefore, the case described in detail by DR. AUGUST WAGENMANN (*Gräfe's Archiv*, Band xxxii. Abth. iv.) possesses a peculiar interest. The patient was a man

of forty-four years of age (February 3, 1886), had no tuberculous family history, and syphilis was excluded. The anterior chamber was partially filled with pus, there was prolapse of the upper portion of the iris, the tarsal conjunctivæ were extremely congested. There was no fundus reflex, the ciliary region was very sensitive to pressure, the visual acuity,  $\frac{20}{100}$  to  $\frac{20}{70}$ . The eye

was enucleated on February 5, and the suspected tuberculosis was proved by finding the characteristic bacilli, and by the inoculation of animals with the pus. Dr. Wagenmann finds from a review of the literature of the subject, that the disease is usually chronic and monocular, generally limited to the age of childhood, and may be painful or not according to circumstances. Early enucleation is always advisable, since, the diagnosis being certain, there can be no hope of saving the eye, and by this measure as well as by general treatment, a great improvement in health is at once observed.

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#### THE PUPILLARY IMMOBILITY OF PROGRESSIVE PARALYSIS.

MÆLLI'S study of this subject (*Archiv f. Psych.*, xviii., 1887) is based upon 500 cases. In about half of the cases the light-reflex was destroyed or much below the normal. In only twenty-eight per cent. was there good reaction. Mydriasis is much more infrequent than myosis. There were twenty cases of pupillary immobility in non-paralytic patients. In the majority of these cases syphilis or alcohol was the probable cause. Binocular immobility existed in twelve cases without cerebral or paralytic disease, and in half of these cases syphilis was the undoubted source.

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#### THE RELATION BETWEEN CHOROIDAL CRESCENT AND ASTIGMATISM.

GEORGES MARTIN (*Annales d'Oculistique*, Mars, Avril, 1887) gives the results of his studies of the relation of the choroidal crescent about the papilla to the axis of astigmatism, and finds in the great majority of cases, perhaps in all, that the crescent is situated at the extremity of a partial contraction of the ciliary muscle, and that this contraction is the cause of its appearance and development. All eyes with a crescent, he finds, are astigmatic, and the direction of the lesion is in a plane parallel to one of the principal meridians, generally, in the one of least refraction. In 358 cases of regular or vertical astigmatism, 336 crescents were external and 22 inferior. In 24 cases of horizontal astigmatism, the crescent was vertical in every case. Of 22 cases of oblique astigmatism, the crescent was vertical 15 times, and 7 times was parallel to the axis of corneal astigmatism. In dynamic or lenticular astigmatism of the 9 cases reported, the crescent and spasmodic astigmatism had the same direction. In 413 cases, therefore, of all kinds examined, the relation was proved to exist in 384 instances; or in about 93 per cent. In 77 cases that are tabulated, 13 were emmetropes, 7 hyperopes, and 55 myopes, 2 cases not being determined.

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#### CASES OF PRIMARY GLAUCOMA IN THE YOUNG.

Two interesting cases of glaucoma in young people are reported by DR. O. LANGE in *Gräfe's Archiv*, Band xxxiii. Abth. i. The first was in a man of twenty, and had continued with the usual symptoms of clouded vision,



rings about lights, frontal headaches, etc., for over a year, with many sub-acute attacks. Latterly the abnormal increase of intraocular pressure had the peculiarity of an exact rhythmical occurrence. In the morning the pressure was high, decreasing toward noon, and disappearing entirely during the latter part of the day. At first, eserine controlled the glaucomatous symptoms, but it finally became powerless to affect the periodical rise and fall of the pressure. A sclerotomy, according to de Wecker's method, gave permanent relief for several years, when the attacks again came on, and, eserine once more proving of no avail, an iridectomy was made with the desired result of relief up to date. In the second case, a girl of twenty-two, the primary attack was connected with an amenorrhœa of seven months' standing. A de Wecker sclerotomy gave complete relief from what had been severe and frequent attacks of the usual glaucomatous symptoms. The author also adduces an instructive case of recurring glaucoma in a clarinet player, who was always seized with an attack after playing upon his instrument. Eserine, previous to an evening's engagement, always aborted the attacks. From these instances Lange argues that the glaucomatous tension may be superinduced by circulatory disturbances, though he is so far from exclusively accepting this, or any other theory, that he sharply, and with much effectiveness, criticises those who thus accept any exclusive dogma of the etiology of the affection. Eserine, which enlarges the vessels, is, for this reason, deemed to have its good influence in reducing the tension, but the author seems to forget that amyl nitrite has no such effect upon the intraocular tension. Mauthner's astounding theory that the increased tension does not necessarily belong to the glaucomatous symptoms, is as sharply criticised as the reverence due to great names will allow. As to the relative frequency of glaucoma in hyperopia and myopia, the author would modify the common belief that it is indiscriminately and excessively higher in hyperopia. Of his 163 cases of primary glaucoma, he finds that of 69 cases of glaucoma simplex, 30 were in myopic eyes, and 38 in hyperopic. In *glaucoma cum injectione*, the proportions were about as commonly given: 10 in myopes and 81 in hyperopes. In the *Archives of Ophthalmology* for June, Dr. R. L. Randolph reports a case of glaucoma in both eyes in a child of eleven years that had existed for over a year. No clew was obtained as to a family history. Vision was  $\frac{6}{36}$  in the

right eye,  $\frac{6}{60}$  in the left, both eyes were under abnormal intraocular pressure, the left being of a stony hardness to the touch. The papillæ were cupped, and there was venous pulsation. The disease was not complicated with any other that could be learned. Operation was declined.

#### THE PATHOLOGICAL ANATOMY OF GLAUCOMA.

BIRNBACHER and CZERMAK (*Gräfe's Archiv*, xxxii. 2 and 4) present an excellent account of the minute anatomy of seven glaucomatous eyes. The general results are in harmony with Schulten's experiments, viz., that any causes that increase the difficulty of the venous outflow, or that increase the arterial supply, tend to raise the intraocular tension. It is shown that the eyes under study give evidence of circumstances operating toward increased

pressure, in that there is lessened lumen of the veins, caused by inflammatory changes and thickening of their walls, which changes also had the effect of cutting off the ready escape of lymph and other fluids. The primary source of the mischief is thought to consist in injuries of the uveal tract consequent upon inflammation, which prevent the escape of lymph and venous blood.

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#### THE INFLUENCE OF MYDRIATICS AND MYOTICS UPON INTRAOCULAR PRESSURE.

In *Gräfe's Archiv*, Band xxxiii. Abth. i., DR. FRIEDERICH STOCKER publishes the results of his numerous experiments with the principal mydriatics and myotics upon the intraocular pressure of cats, under normal or physiological conditions. Morphine and chloroform were found ill-adapted as narcotics, and curare alone was resorted to. The tension was measured with a manometer, especially constructed for the purpose. The reader may be astonished to learn that the invariable result of the extended experiments was, that, under the influence of atropine, there was a slow diminution of the intraocular pressure. With cocaine there was also a lessening of the tension in every instance,<sup>1</sup> preceded, however, in the majority of cases, by a slight temporary increase of the tension. With eserine there resulted an increase of tension without any stage of diminished tension, but the *final* effect of eserine was to reduce the pressure to a greater degree than it had been raised. Pilocarpine slowly reduced the tension after a preliminary stage of strongly varying pressure, during which there was an average elevation of pressure in both eyes. In all the experiments it was proved that the pupillary play stands in no necessary and essential relation either to the increase or decrease of tension. This result is in direct contradiction to the conclusions of Hölztker and Gräser, who found (No. 13, *Verhandl. d. physiol. Gesellsch. zu Berlin*) that the pressure was raised with the widening, and fell with the narrowing, of the pupil. Regarding the radius of the corneal curve, the experiments show that the mydriatics atropine and cocaine have no influence upon it, in so far as may be learned by the ophthalmometer. The myotics eserine, and pilocarpine have the effect of shortening the radius during the myosis by one-tenth to two-tenths of a millimetre.

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#### SUBCONJUNCTIVAL SCLERAL FISTULA IN GLAUCOMA.

M. MOTAIS communicated to the French Ophthalmological Society (Seance of May 4—v. *Recueil d'ophth.*, June, 1887) his method of operation in cases of hopeless glaucoma. When iridectomies are impossible, or have been proved of no avail to lessen the abnormal tension, and when other devices have failed, and an enucleation seems inevitable, M. Motais recommends the establishing of a fistula. He rotates the globe downward and inward, and plunges a knife into the vitreous at a point between the tendons of the superior and external rectus. The pressure of the eye prevents the healing of the sclerotic wound, but the conjunctiva soon heals, and a subconjunctival fistula is formed, so

<sup>1</sup> Elizabeth Sargent, M.D., in *Archives of Ophthalmology* for June, reports a case of diminution of intraocular pressure in a woman, and relief from pain and other glaucomatous symptoms for six or seven months, by the instillation of cocaine.

that the intraocular fluids are in communication with the subconjunctival pocket. In the fifteen cases so treated in the past three years, there was a temporary relief in but two, owing to the failure of the fistula to become permanently established. In the thirteen successful cases the tension has remained normal, and the pain and other glaucomatous symptoms have not returned.

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#### THE SPONTANEOUS ABSORPTION OF SENILE CATARACT.

DR. PAUL MEYER, in *Gräfe's Archiv*, Band xxxiii. Abth. i., reviews the literature of the reported cases of spontaneous absorption of senile cataract. He finds that many are open to doubt and discussion, but that others, and especially the more recent cases, are so carefully observed, and with such intelligence, that denial of the fact is no longer possible. There is, of course, no question that juvenile cataract is frequently so absorbed, but as to senile absorption, conservative thought has heretofore been inclined to doubt either the accuracy of the previous diagnosis, or the trustworthiness of the report of reinstated vision. In the June number of the *American Journal of Ophthalmology*, DR. CHARLES J. KIPP supplements the meagre literature with another case of spontaneous absorption of senile cataract without injury to the capsule of the lens, and with a restoration of excellent vision. The case is well reported, and there seems to be no doubt of the accuracy of the statement.

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#### THE RELATION OF ACCOMMODATION-STRAIN TO GLAUCOMA AND CATARACT.

To the ophthalmic surgeon the three ocular affections of exceptional importance are certainly those mentioned in the above title, and in uniting the three in a nexus of cause and effect DR. W. SCHOEN, (*Gräfe's Archiv*, Band xxxiii. Abth. i.) decidedly justifies his happy motto: *simplex sigillum veri*. There can be little doubt that we are only beginning to realize the widespread and variously injurious effects of eye-strain upon the organism generally, and upon the eye in particular. That the accommodation-strain of ametropic eyes may produce glaucoma and cataract is the thesis that Dr. Schoen renders far more than plausible. In hyperopic, astigmatic, and presbyopic eyes (the ones peculiarly strained) the persistent and irritating strain of the ciliary muscle upon its two attachments leads to the accommodative excavation on the one side, and to folding of the lens capsule with radial opacity on the other. Eighty per cent. of the patients subjected to accommodation-strain showed the expected accommodative-excavation. Of 95 cases of equatorial cataract, 92 showed the excavation, and there were in these 95 cases, 39 astigmatics, 39 hyperopes, 11 presbyopes, and 4 whose refraction could not be determined—nearly or quite 100 per cent. showing uncorrected refractive error. There was no case of nuclear opacity without equatorial cataract, and 90 cases of the latter without the nuclear sclerosis, showing that the equator is the starting point of the opacity. Besides refractive errors, leucoma of the cornea, extremely fine work, wearing too strong convex glasses, etc., may produce the strain. The consequences are, accommodative excavation, capsular folds, and hypertrophy of capsular epithelial structure, with other subsidiary injuries, such as overcorrected astigmatism (by the lens), halo, venous



pulsation, blepharospasm, inflammation, etc. The final results are glaucoma simplex, cataract, glaucoma acutum.

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#### VISUAL DISTURBANCES RESULTING FROM CAUTERIZATION OF THE NASAL PASSAGES.

In the *Archiv für Augenheilkunde*, xvii-iii., E. BERGER describes a case believed by him to be unique, where the application of the galvano-cautery to the nasal passages produced a decided amblyopia ("everything as if through a thick fog"). The subsequent spontaneous recovery was gradual. In the *Centralblatt für praktische Augenheilkunde* for May, 1887, DR. ZIEN presents three similar cases of ocular troubles. In the first case cauterization of the hypertrophied mucous membrane of the middle turbinated bone of the right side was followed by indistinctness of sight of the right eye. Sph. + 4.5 gave V.  $\frac{20}{40}$  with the right eye; sph. + 4.00, V.  $\frac{20}{20}$  of the left. There was pulsation of the veins of the right papilla; none in the left. There was also slight limitation of the right visual field as compared with that of the left. In the second case, cauterization of a small tumor in the inner canthus of the left eye was followed by impaired vision and decided hyperæmia of the papilla of the left eye. In the third case cauterization of the nasal passage, followed by some hemorrhage, seemed to reduce the intraocular tension, and to produce pronounced venous pulsation and papillary hyperæmia.

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#### EPIDEMIC HEMERALOPIA.

In the *Archiv für Augenheilkunde* of June, 1887, DR. THEODORE KUBLI recounts a curious phenomenon occurring in Russia in connection with the church fasts before Easter. Meats and even eggs are forbidden, and, as the period of fasting lasts for seven weeks, there is a great deal of resultant ill nutrition of the body. With other organs, the eye feels the effects of this regimen. Out of 19,588 cases of ocular affections in one hospital in St. Petersburg, from 1882 to 1887, there were 320 cases of hemeralopia, nearly every patient being of the orthodox faith, and the hemeralopia appearing during the fasting season. During the other fasts, extending over much shorter periods of time, there were but few cases presented. As concerns the ages, the older the person the greater the immunity. Of 200 cases of men there were 61 cases, each, from 10 to 20 and from 20 to 30 years of age; 43 from 30 to 40; 18 from 40 to 50; 12 from 50 to 60; 5 from 60 to 70. Among the number many had the hemeralopia every year from youth. Pregnancy predisposes, but it is noteworthy that of the 320 cases 241 were men. Other ocular symptoms than the hemeralopia were, of course, frequently present, as epiphora, blepharitis, conjunctivitis, xerosis, keratitis, etc., but there were no considerable ophthalmoscopic changes, and the range of accommodation was not affected. The field [?] and the color sense were also normal. Diminished reaction to light was the distinguishing symptom. With Förster's photometer 15 cases had less than one-half the normal sensitiveness, 9 cases less than one-tenth, 11 less than one-twentieth, 8 less than one-fiftieth, and seven less than one-

hundredth. The hemeralopia at once disappears with the resumption of a better diet. Other therapeutic measures were ineffectual. The popular remedy is therefore the best, and this is cooked liver, an article of food not held to be meat by the rigorous devotees!

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#### MINERS' NYSTAGMUS.

In his interesting lecture on this affection (*Brit. Med. Journ.*, July 16, 1887) C. S. JEAFFRESON brings both clinical facts and general logic to show that the theory of the local character of the disease advocated by Mr. Simon Snell and others is no longer tenable. Many facts go to show that the disease is of central origin, and that the general system may largely share in the morbid process. Choreic movements of the face and extremities, frontal headache, epigastric fluttering, spinal pain, general distress, and even a kind of cardiac nystagmus are some of the symptoms noted, and also go far to disprove the theory of Dr. Dransart, of Belgium, that the essential feature of the disease is a myopathy of the elevator muscles of the globe. The lecturer's theory is that the miners' position produces an interference of vascular supply of the head generally, but chiefly of the parts supplied by the basilar arteries. Hence the ill-nutrition of the visual centres, and the frequent hemianopsia. There is probably also an injurious pressure of the tentorium cerebelli upon the pons, caused by the miners' position, and the cerebellar function being the coördination of muscular action, it also may be interfered with by the causes mentioned.

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#### REPORT ON 500 ENUCLEATIONS OF THE EYEBALL.

DR. D'OENCH's report of 500 enucleations by Dr. Knapp (*Archives of Ophth.*, June, 1887) is remarkable for the quantity of clinical material shown. As regards the causes: 234, or about 45 per cent., were enucleated on account of injury, 48 of which were because of a foreign body in the interior. "In 8 of them an attempt at removal was made." Tumors ranked next to injuries; glioma, 18 cases (11 in males, 6 in females, 1 unknown); sarcoma led to 30 enucleations; carcinoma to 9; enchondroma to 1. A "slow cyclitic process" led to 74 enucleations; phthisical eyeball to 40; painful stump to 8; staphylocomas to 41 (16 anterior, 15 total, 10 ciliary); absolute glaucoma to 8; ossification of the choroid to 6, etc. In answer to the question whether it is safe to remove an eye in which panophthalmitis has developed, the statistics given show 20 successful cases out of 21 operated upon. 30 cases of death are reported after enucleation.

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#### THE INFLUENCE OF CHRONIC ALCOHOLISM UPON THE EYE.

DR. W. UTHOFF's noteworthy article upon this subject in *Gräfe's Archiv*, Band xxxii. Abth. iv., gathers to a focus the clinical and anatomical results of the study of 1000 cases of chronic alcoholism. As regards the pathological anatomy, the conclusions are based upon the dissection and microscopical examination of seven cases, and the lesion is found to consist of a retrobulbar optic neuritis with secondary atrophy of the fibres. There is a wedge-shaped massing of the nerve fibres about the macula pointing to the central vessels.

At this point there is an interstitial neuritis and degeneration, which is more severe in the retrobulbar portions of the nerve and extending to the cranial part of the same. There is a pronounced increase of the intraneural connective tissue, though healthy nerve fibres are always found running through this network, and in the majority of cases the greater part of the fibres maintain their functional activity. From this fact is explained the common observation that even with positive ophthalmoscopic lesions, vision usually remains normal or but slightly impaired.

The cranial portions of the optic nerve and its branches were not examined, but the degenerative changes became less marked the further they were followed from the eye. They were generally of a crescentic shape in the retrobulbar portions of the nerve. No formation of new vessels was noted. The degenerate fibres were those of the inferior and external quadrant of the papilla, those, therefore, supplying the upper and inner quadrant of the visual field, and were wholly made up of the direct or uncrossed fibres. The macula fibres were, if at all, only slightly implicated. Paleness of the temporal half of the papilla was a constant, and the most pronounced ophthalmoscopic symptom in the cases that were subsequently examined post-mortem. In four out of the seven such cases, there had been little or no previous visual disturbance; in the others vision was more or less below the normal. Simple gray degeneration of the optic nerve was not observed.

Of the total 1000 cases that came under observation, 139 had pronounced temporal paleness of the papilla, and of these, there were 60 instances of visual impairment, either existing at the time or that had been previously noted. Of these 60, five only had had visual trouble for but two months or less, whilst with the rest it had existed from six months to fifteen years. In 26 patients that were certain of a previously existing visual defect, there had taken place a reinstatement of visual acuity so that they could read Sn. 1., though central scotomata for green and red were often found present. Indeed, as is well known, color-sense was much more affected than simple light reaction, green and red sometimes producing no peripheral response. In only 2 cases was the amblyopia excessive,  $\frac{6}{200}$  being the measure in 1 case, and in

the other an absolute central scotoma with a perimacular zone only slightly sensitive to light. There was no case of absolute blindness. In 8 cases the atrophic portion of the papilla was only one-fourth, or less, of its surface. In every instance (of the 60) the lesions were of both eyes. In the remaining cases, 65 of the 139, there was no complaint of amblyopia. 12 had the whitened papilla in but one eye; in 15 cases it was only slightly pale. In 10 cases it was characteristically and decidedly whitened, without producing any visual disturbance; in 8 cases tests were impossible, owing to the patient's condition, etc. In 4 cases, in addition to the temporal change of color of the papilla, there was also paleness of the inner half, though less in degree, coexisting twice with, twice without, defective vision.

In the 1000 cases there were 9 of amblyopia without any ophthalmoscopic changes of the papilla, and 53 in which there was a general cloudiness of the same. There were 6 cases of hyperæmia of the papilla, 7 of retinal hemorrhage, and 60 of pupillary abnormality. Of the latter there were 25 with decided differences of pupillary diameter, 10 with destroyed reflex to light,



and 25 in which it was very slight. Convergence-reaction was almost always preserved. There were 22 cases of paralysis and anomalies of the ocular muscles, 4 of partial xerosis of the conjunctiva, 29 of congenital anomalies of the eye, 15 cataractous lenses, 27 corneal opacities, etc.

The second and concluding article of Dr. Uhthoff (*Archiv*, Band xxxiii. Abth. i.) treats of the special aspects of alcohol amblyopia, and of its relations with other, and especially with tobacco amblyopias. We at last find something authoritative as regards the much-mooted question of the differential diagnosis between tobacco and alcohol amblyopia, and of the relative injury of the eye by these two agents. But it will be regretted that this definiteness is purely negative. Up to this time there has been discovered no reliable ophthalmoscopic sign or other symptom enabling one to decide in any given case. Neither the living fundus oculi, nor visual tests, nor anatomical dissection of the tissues, give any trustworthy answer. The attempt by Poetschke to show a difference in form of the central scotoma (paracentral in pure tobacco amblyopia, pericentral in the alcohol type) is not found to hold.

The following, then, remains the symptom-complex either of tobacco or alcohol amblyopia, so far as concerns visual disturbances: There is central scotoma for red and green in the great majority of cases, and sometimes, also, a failure in response to the same colors in the periphery. In a minority of cases there is a blue scotoma, but it is less extensive than the red and green one. In a very few cases there is an absolute central scotoma—i. e., no response to either color or light, surrounded, first by a zone of blue blindness, and other more extended zones of red and green blindness. The periphery is always sensitive to white light. Few exceptions were found to these rules. There was complete blindness in no instance, and the greatest amblyopia (highly exceptional) was  $\frac{6}{200}$ .

Out of 30,000 cases of eye-troubles examined by the author, there were 204 of retrobulbar optic neuritis; of these 204, there were 64 clearly due to excessive use of alcohol, 23 as clearly due to tobacco, and there were 45 that were either due to the combined use of the two, or in which it was impossible to distinguish between the two agents. 3 cases were caused by diabetes, 1 by lead, and 2 by carbon disulphide. Of the remaining cases not specifically traceable to toxic agents, syphilis and heredity are credited with 7 each; multiple sclerosis with 5; menstrual abnormality, 3; pregnancy, 4; loss of blood in abortion, 2; vitium cordis and periostitis, each 1; and for 32 cases no distinct etiology could be found. Our space will not permit consideration of many interesting questions treated, such as the relative frequency of tobacco and alcohol amblyopia in different countries, the differential diagnosis between these and other toxic and systemic forms of amblyopia, etc.

## OTOLOGY.

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 UNDER THE CHARGE OF

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 MASTOID OPERATIONS.

DR. ALBERT H. BUCK, of New York, has written the article under this heading, in the *Reference Handbook of the Medical Sciences* (Wm. Wood & Co., N. Y.).

He first considers the so-called Wilde's incision, through the integument of the mastoid, down to the bone, as one form of mastoid operation, and then the perforation of the cortex of the mastoid portion of the temporal bone, as, of course, the more important operation. The views of Schwartze, of Halle, are alluded to, in regard to this operation, and are accepted in the main, by Dr. Buck. Schwartze's rules in regard to the indications for the operation are as follows:

"1. In acute inflammation of the cells, with retention of pus, if œdematous swelling, pain, and fever do not subside after antiphlogosis and free incision. 2. In chronic inflammation of the mastoid process with subacute (periosteal) abscesses, or fistulæ in the mastoid. 3. With a sound cortex of the mastoid, on account of cholesteatomata or purulent retention in the middle ear, which cannot otherwise escape, and with which symptoms arise showing that the life of the patient is in danger; or when a congestive abscess has formed in the upper posterior wall of the meatus. 4. When the mastoid appears healthy and there is no pus in the middle ear, but when the mastoid is the seat of long-continued and unendurable pain which other means fail to relieve.

"The operation is of *doubtful* utility in old, incurable middle ear secretion, when no symptoms of inflammation of the mastoid or of purulent retention in the middle ear exist. It is contraindicated when there are positive symptoms of already existing metastatic pyæmia, or of secondary meningitis, or of cerebral abscess."

This latter rule regarding the "doubtful utility" of the operation in pyæmic cases, is not accepted by Dr. Buck, because he holds that in some instances "in which the symptoms of meningitis or of pyæmia were fairly well marked," the operation has been successful in every way. This operation is recommended by Dr. Buck in cases where leeching and a Wilde's incision fail to relieve permanently the pain in the mastoid region. Operation as early as the sixth day is recommended in some cases of mastoid disease, though "the question of an operation upon the bone does not usually present itself for serious consideration before, say, the tenth day, at the earliest."

"In all cases of comparatively recent origin we must not forget one well-established fact, namely, that the majority of them will, in one way or another, get well without the aid of perforation of the bone." . . . "As there are no statistics at hand which give the exact proportion of deaths to recoveries

among cases of acute mastoid disease not treated by the operative method, it is not possible to show, by the statistical methods, exactly how urgent is the need for operative interference." If delirium, drowsiness, or limited paralysis develop in a case in which, judging from its history and from the conditions observed in the ear, we have already concluded that perforation of the mastoid process would be a useful procedure, we shall certainly be justified in stating that without the operation the chances of recovery are likely to be small. It is in this latter view that Buck differs from Schwartze, in believing that good may come from opening the mastoid even after cerebral and pyæmic symptoms have set in.

Finally, it is claimed that "the operation should be urged as indispensable to life and health in those cases of chronic discharge from the ear which have been characterized by frequently recurring and severe attacks of pain, on the same side of the head, and in which an examination leads us to believe that ulcerative action, with insufficient outlet for the pus toward the middle ear or the external auditory canal, is going on unchecked."

Since among cases of ear disease, in which the mastoid process is more or less involved, there are such great differences, it is extremely difficult, in Dr. Buck's opinion, "to formulate rules which are likely to be of much use to one who sees mastoid disease rarely." In performing the operation of perforation of the mastoid cortex, and exposing the antrum, an imaginary line should be drawn vertically through the mastoid tip, and another at right angles to it, running through the uppermost boundary of the external auditory meatus, and the perforation made close beneath the latter, "as close to the meatus as the shelving condition of the bone will admit." A drill is preferred to any form of gouge, chisel, or trephine by Dr. Buck. In the after-treatment unobstructed drainage must be maintained. Simple antiseptic dressings, and washings by weak bichloride solutions are recommended. The injections into the wound (antrum), as a rule, may be stopped in a week.

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#### FOREIGN BODIES IN THE EAR.

Usually injections of warm water in the external ear will be sufficient to remove foreign bodies from that cavity. There occur cases in which, however, the surgeon must have recourse to other means. And this has induced DR. CHARLES DELSTANCHE, of Brussels, to publish some cases occurring in his practice, illustrative of removal of foreign substances from the ear by other methods (*Annales des Maladies de l'Oreille*, February, 1887).

The first case is that of a man, thirty-eight years old, who used a feather to mop his ear, and apply to it a remedy for chronic otorrhœa. When he was examined by Delstanche, it was found that a piece of the feather had been forced forward and downward toward the Eustachian tube through a perforation in the drum, and by its presence there had kept up great irritation and inflammation of the ear. The fragment of the feather was removed by means of delicate forceps. The hearing improved at once, but as the man had to travel in his business no report as to the effect on the otorrhœa is given.

A second case was under treatment for a mastoid abscess involving the bone, and accompanied by purulent otorrhœa. The sinus in the mastoid communicated with the drum-cavity. A piece of elastic bougie,  $1\frac{1}{2}$  inches long,



was used as a drain in this sinus. Permission was given to take the patient, a child thirteen years old, to the country, on condition that the drain was maintained in the mastoid fistula. After an absence of five months the patient was brought back in a worse condition, the directions not having been carried out. The mother stated that in the course of the first month after leaving the doctor, the piece of bougie used in the mastoid fistula became fixed and she could not move it. In a day or two it disappeared from view, and the child's ear had then grown worse, and had run more profusely; a small fistula still existed. Examination and syringing failed to detect the foreign substance in the mastoid cavity, middle ear, or Eustachian tube. In three days after the endeavors to find it, the piece of elastic tube came out at the auditory meatus, in a macerated and decomposed state, after a sojourn of five months in the ear.

In a third case, a piece of carrot was put into the ear, and pushed further in by tentative means of extraction, and this was followed by cerebral symptoms.

A laboring woman, forty-two years old, put into her ear a piece of carrot to cure a toothache according to a popular prescription. The next day, when she was unable to remove this, she sought in her fright a physician, who endeavored by dressing-forceps to remove the foreign substance. His efforts resulted only in profuse hemorrhage and prolonged syncope. Fearing again to expose herself to such treatment she applied poultices to her ear, which soon became the seat of violent inflammation and abundant suppuration. Fifteen days after the event she was seen by our author for the first time. She then complained of violent pains in the ear, accompanied by tinnitus, vertigo, and frequent vomitings, which kept her in bed. The tumefaction of the external ear was so great as to prohibit examination of the auditory canal. At first leeches around the ear, and a solution of lead for dropping into the ear, constituted the treatment, but as this failed to change the local symptoms, and as the vertigo and vomiting continued, together with intense earache, meningeal complications were feared, and it was resolved to endeavor to dilate the auditory canal by means of sponge-tents. After allowing a sponge cylinder to remain a half hour in the swollen canal, the latter was sufficiently dilated to permit a view of the outer end of the piece of carrot. A portion of this was then removed. The next day, a sponge-tent was again allowed to swell in the partially freed canal, and the rest of the carrot was taken out. It was found to be the tip-end of a carrot, about one-third of an inch long and one-sixth of an inch wide, and evidently had rested against the membrana tympani. All the inflammatory symptoms now ceased, and in two days the membrana could be seen and was found to be uninjured, though macerated. The hearing became normal in a short time.

In a fourth case, a young lawyer, who had scratched his ear with a Swedish safety match, had at last perforated the membrana in its antero-superior quadrant, and broken off the inner end of the match, leaving it in the membrane. This was carefully seized by small forceps under proper illumination, and successfully and painlessly removed. It measured one-third of an inch in length and was one-tenth of an inch in diameter.

A fifth case is a curious one of encysted foreign bodies in both lobules of a little girl, twelve years old. The lobules had been pierced at three years of age, and she had worn ordinary ear-rings until in her twelfth year, when she

had inserted by a jeweller a modern form of ornament consisting in a jewel for the outside of the lobule, mounted on a shaft, which, passing through the lobule, is held in position by a small screw-nut on the under surface of the lobe. The shafts were evidently too large for the perforation, and caused inflammation and pain, and, finally, profuse suppuration. The child was forced by her parents to endure the pain and the suppuration, which she did for some weeks. Finally, in two months the discharge ceased and the swelling abated. It was then found that the little nuts on the under surface of the lobule had become invisible. Although there was now no suffering, the parents alarmed at the large size of the lobules, resolved to remove the ornaments which were still *in situ* in the ears. This was easily done by unscrewing the shafts in front. These were removed, but the nuts remained in the lobule. Dr. Delstanche's aid was then sought, because the lobules seemed to be getting larger. He discovered a round, hard tumor, the size of a cherry-stone, in each lobe. On the right side the opening was healed both behind and in front of the encysted body, but on the left side the opening on the front of the lobe persisted. Through this, after some previous stretching, the nut was removed. It consisted of a small disk of gold-plated silver, one-tenth of an inch thick, and one-sixth of an inch in diameter, with a milled edge. The disk encysted in the other lobule was removed through an incision on the back of the lobule.

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#### BOXING THE EARS.

DR. SAMUEL SEXTON, of New York, has written an interesting paper on this subject, giving special attention to its medico-legal aspect (*Med. Record*, June 11, 1887). It is claimed that nearly all blows upon the side of the head may injure the ear, and thus range themselves under this category. The article is based on the notes of fifty-one cases, thirty-one being males and twenty females. Of the men, thirteen were boxed upon the right ear, and thirteen upon the left, and three of them upon both ears, one was kicked by a companion upon the ear while bathing, and in one, the ear was injured by having the head squeezed between the hands of another person.

Of the women, fourteen were struck upon the left ear, and six upon the right. Five of the women were assaulted by their husbands. Of the entire number of cases, eight were boxed in play, four by rigorous pedagogues, two by parental disciplinarians, and one, a fervent lover, was struck on his ear by an indignant sweetheart.

Several cases occurred among pugilists, the left ear being usually struck in cross-counter. Others were due to assaults, brawls, and contests generally. Parents ignorant and cruel enough to box children's ears are not likely to take them when injured to a surgeon; hence the comparatively small number of children brought to the dispensaries with ears avowedly injured by boxing, though a large number of those coming for other affections of the ear could recall having had the organ slapped or pulled previously, and then having had subsequently severe pain, tinnitus, and vertigo.

A not uncommon result of a blow or fall upon the ear is the impaction of a plug of cerumen which gives rise to pain, and if it lie long in contact with the membrana tympani, to inflammation. Rupture of the drum-mem-

brane in such cases is often due to the compression of the air in the auditory canal.

The symptoms after a boxing or blow on the ear, are numbness and autophonia with tinnitus. The patient usually feels stunned, but in the entire fifty-one cases seen by Dr. Sexton, only one actually was felled by the blow, and none were rendered unconscious. The dizziness is usually brief; pain is usually felt immediately, though it may not ensue for some hours as a reactive process or as a result of meddlesome treatment. Deafness may be scarcely perceptible. Autophonia is a very constant symptom. In the fifty-one cases under consideration, seven had no discharge, six had a serous discharge only, and in none of them were there any inflammatory symptoms. In six cases there was decided inflammation of the drum and swelling of the drumhead, but no discharge. In twenty-five cases suppurative inflammation of the drum occurred, with more or less severity. In six cases particulars on this head were not noted.

The drum-membrane is usually congested, chiefly in the *membrana flaccida*, and on the malleus. Multiple ruptures may be found, though usually they are solitary. Their shape varies. If large, they often heal by forming a manometric cicatrix. The prognosis is usually favorable. The diagnosis is not difficult if the ear is examined early enough, or before inflammation has set in. Ruptures from boxing occur for the most part in the *membrana vibrans*, while contusions and lacerations from pulling the auricle occur in the *membrana flaccida*.

"A differential diagnosis becomes more difficult when inflammation of the drum, from causes other than traumatic, exists before the injury, or arises subsequently." The appearance of the drumhead a few days after traumatic rupture may suggest a fracture of the malleus; but as the swelling subsides, it will appear that no fracture has occurred.

*Treatment.* The safe rule, according to Dr. Sexton, is to abstain from doing anything. We would add, excepting to protect the exposed mucous membrane by placing some cotton in the external auditory meatus. Great injury may ensue upon the instillation of any fluid into the canal after such ruptures of the *membrana tympani*.

The medico-legal aspect of boxing the ear often becomes an important one. But medical jurists must bear in mind that the extent of aural injury where the patient has been assaulted by a blow upon the side of the head, is not to be measured by the force of contact, but rather by the nature of the blow. Sometimes a very slight force, by compressing the air in the auditory canal, ruptures the drum-membrane. It must also be borne in mind that the treatment of the ear, after the occurrence of the rupture of the *membrana*, has done more harm than the rupture itself, since, if let alone, the opening in the drum-membrane will soon heal.

It is very wisely remarked by the writer of this paper, that the assailant is not the only person to be held accountable for the results of injudicious treatment or neglect. According to law, if one suffering physical harm from the wrongful act or omission of a defendant in a suit, calls in good faith such medical attendance as it is reasonable to presume would be competent to effect his cure or restoration to health, and the physician or surgeon so-called, by erroneous treatment causes positive harm, the plaintiff shall nevertheless re-



cover in the action for damages. If the physician's malpractice could be established, the plaintiff might find him, if pecuniarily responsible, a more desirable defendant than the original assailant.

It is also important to find out whether there has been deafness, or discharge from the ear, previous to or at the time of the alleged injury, and if so whether any increase of the trouble was caused thereby. This is a point concerning which reliable evidence is in many cases either wanting or difficult to get, since in children both may exist without the parent's knowledge.

"The question of permanent injury from shock is likely to come up in some cases. Every one knows that falls and blows upon the head often give rise to vertiginous phenomena, but serious labyrinthine concussion as a complication of ear-boxing is comparatively rare, since the concussion from blows with the hand or fist is broken by the membrana thus protecting the round window." When trauma has produced purulent inflammation of the ear, vertigo, autophonia, and various forms of tinnitus as well as deafness may remain permanently. It is well to remember that deafness from chronic catarrh of the middle ear is more frequently found in the left ear.

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#### CHRONIC PURULENT INFLAMMATION OF THE TYMPANIC ATTIC.

DR. H. N. SPENCER, of St. Louis (*St. Louis Courier of Medicine*, May, 1887), having had a number of cases affected with the above-named disease, has had an opportunity of further studying this interesting and usually intractable disease. The reason this disease does not readily yield to treatment is because it is inaccessible to the ordinary means of cleansing and medication employed for cleansing the lower part of the tympanic cavity or atrium.

Acute inflammations of the attic are characterized by more intense pain than usually accompanies ordinary suppurative disease of the tympanum. They are often confounded with inflammation of the mastoid. Examination of a case of acute inflammation of the membrana flaccida shows it to be characterized by intense redness and tumefaction at the junction of the upper wall of the canal with the membrana flaccida. A free incision with constitutional phlogosis meets the early indication. Judicious local treatment and tonics insure a good result in from one to six weeks.

The chronic cases of purulent inflammation of the attic are not so easily disposed of. This chronic process may be limited to the attic, or it may be associated with purulent disease in the atrium. Dr. Spencer has not observed any marked tendency of this disease to extend to the mastoid cells. He also says, very justly, in our opinion, that "either diseases of the mastoid are of less frequent occurrence in the West than in the East, and less in this country than abroad, or perforation of the mastoid process is often unnecessarily performed; and an overweening desire to add to a number of operations magnifies the subjective and objective indications for surgical interference, and prejudices the otherwise good judgment of the operator. I make this statement with some hesitation, but from a conviction of the truthfulness of it, so far as *my experience* has gone, founded upon upward of twenty-five thousand cases of ear disease seen in private and hospital practice."

There may be said to be two forms of purulent inflammation of the attic, one characterized by swelling and a tendency to poliferation and organization

of tissue, and the other by a thinning of tissue, or tissue-waste. These forms are intensified and rendered more serious by reason of the extended and complicated surface presented by the attic. This space and its contents are, of course, functionally of the greatest importance, as it contains the head of the malleus and the malleo-incudal joint, and the entire body of the incus excepting its long process, which extends downward into the atrium. The opening by which drainage takes place in these cases is in the *membrana flaccida* (Shrapnell's membrane). In very chronic cases, the *membrana vibrans*, the portion below the folds of the *membrana tympani*, will be found to have been destroyed, and of the malleus only a stump will be found.

In all of these conditions of perforation or destruction, when the hyperplastic form of inflammation predominates, the edges of the openings and the surfaces of the cavity, so far as they can be seen, appear red and swollen; not infrequently there will be villous projections, papillary growths, and even large polypi. When the second form, tissue-waste, prevails, the edges of the openings are thin and white, and the tissues beyond are characterized by the same appearance. The discharge is often scanty, and not found until the attic has been explored; it is then apt to be dark brown in color. This second form is the more intractable of the two, and is more likely to result in caries of the bone. The head of the hammer, first, and next in point of frequency, the head of the incus, is liable to become affected by carious action.

Treatment must take into consideration the nature and locality of the lesion. In cases of suppuration of the attic, presenting polypi and polypoid masses, we are advised "to curette the mass or masses as high up as it is possible to do so." An anæsthetic may be employed or not, as seems best. Immediately after the operation, a saturated solution of nitrate of silver is applied, by means of a small cotton tuft fastened to the cotton-holder, well up into the cavity. Dr. Spencer has not found it necessary to neutralize this, but simply dries the parts with absorbent cotton, in order to remove any excess of fluid. Pain, not excessive, may follow this application for two or three hours. Following this procedure, before the slough comes away, instillations of absolute alcohol, or a saturated solution of boric acid in absolute alcohol, are recommended.

In the second class of cases, referred to already, the therapeutical requirements are different, since a plastic process must be controlled. Peroxide of hydrogen may now be employed, and after this application, a five per cent. solution of carbolic acid. Nitrate of silver may also be used in these cases at some part of the treatment, but all stimulation must be of a mild character. In regard to cleansing the ear, Dr. Spencer does not wash out the cavity so often as many do, because he believes that the too frequent use of the bath exercises a prejudicial influence upon any tendency in the tissue toward healthy action." He also believes that while the syringe is indispensable at times, it may also become a means of doing much harm by delaying recovery. "The sooner the syringe is placed in the same category with the paracentesis needle, the sharp curette, and Wolf's spoon, to be employed when a real indication exists, the better for otology and humanity." For these cases a cotton-holder of steel, and unnotched at the end, is recommended. The end sought is great inflexibility, the ordinary cotton-holder being too flexible for the manipulation here set forth.

## DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

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UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

PROFESSOR OF DISEASES OF THE THROAT AND CHEST, PHILADELPHIA POLYCLINIC.

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### MOULD-FUNGI AS CAUSES OF DIPHTHERIA.

DR. MICHAEL W. TAYLOR reports cases corroborative of his theory that some common mould-fungi, growing under certain conditions, might originate diphtheria or transmit it. These views are confirmative of views long ago promulgated by Jodin, and to which too little attention has been given by more recent writers on diphtheria.

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### UNUSUAL CUTANEOUS PIGMENTATION IN DIPHTHERIA.

WERNER (*Wurtemberg Correspondenzblatt*, No. 7, 1887; *Journal of Laryngology and Rhinology* for May, 1887, p. 169) noted peculiar black spots on the skin of the under lip of a child eight months of age, which appeared twelve to eighteen hours before death, and spread diffusely. They reappeared when brushed away. The mother, after cleansing the child's nose and mouth, saw the same set of black points upon the back of her hands, but could not remove them by brushing. They resisted applications of antiseptic washes. Some weeks later they were scraped away with a knife. They resembled the spots left after a burn with gunpowder. No microscopic investigation was made as to their nature. No other cases were observed.

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### ATROPHIC RHINITIS.

DR. DELAVAN, of New York, at the late session of the American Laryngological Association, spoke very encouragingly of treatment by the galvanic current with a force of from four to seven milliampères, the positive electrode to the nape of the neck, and the negative one to the mucous membrane. His only objection was the length of time required in treatment. This is a reintroduction of a treatment of many years ago practised without that insight into the influence of electric currents accumulating with recent experience and study.

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### REMOVAL OF NASOPHARYNGEAL TUMOR AFTER RESECTION OF THE SUPERIOR MAXILLA.

DR. NATHAN JACOBSON, of Syracuse, N. Y., reports (Proceedings of the New York State Medical Association, 1886, reprint) an interesting instance of formidable nasopharyngeal myxosarcoma with prolongations into the nasal passages, the antrum, and elsewhere, to remove which he was compelled to resect the upper jaw chiefly after the method of Fergusson. The subsequent



rather perilous progress of this successful case is carefully narrated; some general remarks follow on nasopharyngeal growths and methods of treating them, and the article concludes with a table of twenty-eight similar operations performed in the United States, of which seventeen terminated successfully, the result in two remaining unstated.

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#### OZÆNA.

HABERMANN, of Prague, basing his opinion upon histologic investigation (*Zur pathologischen Anatomie der Ozæna simplex seu vera. Zeitschrift für Heilkunde*, Bd. vii., Prag., 1886; *Semon's Centralblatt*, March, 1887), concludes that ozæna simplex consists in a fatty degeneration of the glandular epithelium, acinous and Bowman's, and apparently of the epithelium of the inflammatorily infiltrated mucous membrane. The transformation of the mucous membrane into a fibrous connective-tissue and its shrivelling, he regards as at first a result of this disease, a result of the reaction of the healthy tissue against the morbid action in the diseased tissue. These changes he has not seen in hypertrophic nasal catarrh or any other nasal disease, and so he regards them as characteristic. He does not attribute their origin, with Krause, to compression of the vessels, but thinks rather that it is due to an agent which gradually works deeper and deeper into the glandular structures, because he finds such glands diseased in their excretory orifices and their superficial acini while the deeper parts remain normal. In the diseased tissues he has never found the microorganisms which he almost always finds in the ozænic secretions. He does not believe that hypertrophic catarrh is a necessary precedent of ozæna simplex, especially as the histologic conditions of the mucous membranes differ in the two affections.

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#### TUBERCULOUS TUMORS OF THE NASAL MUCOUS MEMBRANE.

DR. MAX SCHAEFFER, of Bremen, and DR. DIETRICH NASSE (*Deutschen medicinische Wochenschrift*, 1887, reprint) report eight instances, chiefly in females, observed by Dr. Schaeffer in a total of more than 450 cases of intranasal tumors. The tuberculous nature of the tumors was proven by detection of the bacillus Kochii. All eight originated in the septum narium in its cartilaginous portion and progressed backward. They presented in individual masses, some of them as large as small walnuts, with uneven raspberry-like surfaces. They varied in color from pale to dark red, bled readily to the touch, and were covered with purulent mucus. They felt soft and friable at the surface, and but little harder toward the base. Their removal left a flat ulcer with soft wall-like granular edges and dirty grayish-yellow floor. The underlying cartilage was soft, and showed great tendency to destructive degeneration, which, in three of the cases, terminated in perforation. Posteriorly, there was similar tendency to disintegration of the periosteum; and destruction occurred in one instance. Six of the eight patients had more or less hereditary tendency to tuberculosis. In no instance was there any lupus exteriorly, or any other external evidence of disease except knobby thickening of the anterior part of the nose. There was no evidence of syphilis in any instance. Laryngoscopic inspection and exploration of the chest

revealed only negative conditions. In cases of long standing, the morbid growth had extended further backward, and engaged the mucous membrane of the middle turbinated body, and even the anterior portion of the mucous membrane of the floor of the nose; and in two instances the opposing surface of the lower turbinate was involved, probably by erosive infection. Three cases observed in their commencing stages left no doubt that this form of tumor always originates in the cartilaginous septum.

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#### NASAL VERTIGO.

DR. JOAL, of Mont-Doré, has reported to the Société Française de Laryngologie et d'Otologie (*Revue Mens. de Laryngology*, etc., July, 1887) several instances showing that certain vertiginous conditions often attributed to stomachic and other influences are due to temporary or permanent lesions of the nasal passages, curable by treating the nasal lesion. He regards the vertigo as a genuine reflex result of the irritation of the terminal branches of the trifacial nerve distributed upon the mucous membrane of the intranasal structures; a cerebral anæmia being produced by transmission of the irritation through the sphenopalatine ganglion to the vasomotor nerves.

A correspondent, H. D. F., of *The Lancet* (July 2, 1887, p. 83), states that he had been a severe sufferer from hay fever for some forty-five years, climate the most varied, even desert land, making little difference, freedom having been experienced only during long sea voyages around the Cape. At about fifty-six years of age, he suddenly became free, but with absolute loss of the sense of smell, and occasional unearthly objective sensations passing into vertigo and momentary unconsciousness. Though still free from hay fever, he thinks he sneezes more frequently than most people.

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#### THE PATHOLOGICAL NASAL REFLEX.

At the last annual meeting of the American Laryngological Association DR. JOHN NOLAND MACKENZIE, of Baltimore, read an entertaining histological study which will agreeably surprise all our readers by its exhaustiveness and its references to show that Plato, Hippocrates, Aristotle, Rhazes, Scribonius, Largus, Galen, and a host of others were aware of the connection between nasal affections and reflex manifestations at a distance. The paper, which should be read at length to be fully appreciated, appears in the *New York Medical Journal* of August 20, 1887.

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#### RELIEF OF CONGESTIVE HEADACHES BY INTRANASAL SCARIFICATION.

DR. GLASGOW, of St. Louis, finds (in proceedings of the American Laryngological Association, 1887, *The Medical News* of June 4, 1887) the cavernous bodies full and tense in congestive headaches, the degree of tension corresponding, to some extent, to the degree of headache. For four years he has treated these cases satisfactorily by local abstraction of blood from a simple prick, relief being immediate in many instances.

## EMPYEMA OF THE ANTRUM.

DR. B. FRÄNKEL, of Berlin (Ueber das Empyem der Oberkieferhöhle, *Berliner klin. Woch.*, 1887, No. 16), after laying stress on the value of rhinoscopy in differentiating from diseases of the antrum certain affections formerly confounded with them, and referring to Ziem's article (*Monatsschrift für Ohrenheilkunde, etc.*, 1886, Nos. 2 and 4), expresses his opinion that empyema of the antrum is usually an extension from the dental alveoli, and only exceptionally, and very rarely at that, an extension from diseased nasal mucous membrane. To drain the antrum, Fränkel prefers perforation through the nasal wall to perforation through the alveolus, because the latter method establishes a communication with the mouth, and then the resultant penetration of microorganisms, saliva, remnants of food, and the like, prolongs the after-treatment considerably. He prefers to penetrate the antrum through the lower meatus, after the method described by Mikulicz (*Verhandlung der deutschen Gesellschaft für Chirurgie*, 15 Congress, Berlin, 1886, p. 178), which avoids the objection to the alveolar method, although the drainage is less perfect. The patient is taught to syringe the antrum once or more daily with some antiseptic solution. One case so treated is reported as cured in three weeks, and three similar operations are referred to in an annotation as having proved fully satisfactory.

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## DEATH FROM ŒDEMA OF THE LARYNX SHORTLY AFTER BIRTH.

H. VOGT, of Bergen (*Norsk Magazin for Lægevidenskaben*, Sept. 1886, *Annales d. mal. du larynx, etc.*, March, 1887, and Semon's *Centralblatt*, March, 1887), describes an instance in a newborn female, with generalized anasarca and a large and tense abdomen. The child weighed six and a half pounds. It was motionless and unable to respire. The heart-beats were feeble. Death took place three-quarters of an hour after birth. The autopsy disclosed ascites with adhesions between the liver and the diaphragm. The heart, lungs, and kidneys were normal. The larynx was obstructed by an extensive œdematous infiltration of the aryepiglottic folds. The placenta was œdematous. The cause of the dropsy could not be determined.

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## SUDDEN DEATH FROM ŒDEMA OF THE LARYNX IN AN ADULT.

At a meeting of the Berliner medicinische Gesellschaft, May 11, 1887 (*Deutsche med. Woch.*, May 19, p. 433), DR. B. FRÄNKEL, of Berlin, presented a specimen from a patient who, when seen by him, had been sick only an hour, and with symptoms of severe dyspnœa. Laryngoscopic inspection revealed serious œdematous tumefaction of the epiglottis and of the aryepiglottic folds. The patient was sent to an adjoining clinic for tracheotomization, but fell dead in the cab on the passage, without any asphyxic paroxysm, and without convulsions. Tracheotomy was performed, and artificial respiration instituted, but without success. Section showed, in addition to the œdema of the larynx, great contraction of the left kidney, the right kidney being enlarged and in a condition of parenchymatous turbidity. Very relaxed heart with slightly thickened left ventricle. The œdema of the larynx seemed to Fränke to have been the first sign of hydremia following contracted kidney.



No anasarca was discovered anywhere. Considerable albumen was found in the urine present in the bladder after death. Virchow raised the question whether the case had not been one of erysipelas, and in the recent session of the Society Fränkel was enabled to answer in the negative, as the result of microscopic investigation for erysipelas cocci. He had found an inflammatory condition which might have accounted for the œdema.

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#### TOPICAL CURES OF THE TUBERCULOUS LARYNX.

At a meeting of the Soc. méd. des hôpitaux of Paris, held May 13, 1887 (*Le Progrès Médical*, Mai 21, 1887, p. 428), PROF. GOUGENHEIM reported twenty-five instances of cure of tuberculosis of larynx, pharynx, etc., by the method of Krause as practised by Hering, namely, energetic friction with strong solutions of lactic acid, in some instances after preliminary scraping or scarification. In thirteen cases of tuberculosis of lungs and larynx a definitive cure was procured in from three to twelve months. In nine others recurrence ensued after cure of the preceding local tuberculosis, and recicatization took place in three of these. There were six instances of cure in cases of ulcerations of the pharynx, the tongue, and the nose.

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#### SWALLOWING RENDERED EASY IN TUBERCULOSIS OF LARYNX.

Under this head (*The Lancet*, July 2, 1887, p. 13) DR. R. NORRIS WOLFENDEN, of London, calls attention to a method of swallowing adopted by one of his patients by which the subjects of laryngeal phthisis can readily drink even large quantities of fluids. The patient placed himself on a couch stomach downward, with the head and arms hanging free over the end, and with the feet higher than the other portions of the body. He then placed a section of rubber tubing six inches in length in a tumbler of water held between both hands, and with the free end of the tube between his lips drained the contents off without stopping, and with the greatest ease and comfort, and without pain or cough. In the ordinary position a teaspoonful of fluid was as much as he could manage to get down, and this only at the cost of much pain and terrible paroxysms of cough.

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#### LUPUS OF THE LARYNX.

DR. MICHAEL GROSSMANN, of Vienna (Ueber Lupus des Kehlkopfes, des harten und weichen Gaumens und des Pharynx, *Medizinische Jahrbücher der k. k. Gesellschaft der Aerzte* in Wien, 1887, iv. Heft, S. 186, illustrated by chromolithographs) in an interesting summary reports two cases, one of which was reported in 1877 (*Allg. Wien. med. Ztg.*, 1877, No. xx.), and has been under his observation ever since.

I. J. W., a ten year old boy, lived for six years in a musty, damp dwelling, and left it in his seventh year with moderate lymphatic tumefaction in the left submaxillary region. Following suppuration undoubted lupus vulgaris began in the edges of the ulcer, and eventually involved the entire skin of the region. Two months after the earliest appearance of lupus in the skin, the

boy began to be hoarse at night without any special exposure and without any special suffering. On laryngoscopic inspection, movement was found almost unimpaired, and nothing abnormal was noticed except general hyperæmia of the larynx. The child was reëxamined two or three times a week at first, and then nearly every day. Nothing but the hyperæmia was noted for nearly two months, despite daily progressive loss of voice to actual aphonia, and there was no local suffering. In the fifth week severe spasmodic cough set in, especially at night. From that time onward, the laryngoscopic picture changed from day to day. The mucous membrane of both surfaces of the epiglottis, of the arytenoid cartilages, and the interarytenoid fold acquired the appearance of a pronounced trachoma of the conjunctiva. The deeply injected mucous membrane had lost much of its pellucidness, and its surface was closely overlaid with granulations varying in dimensions from small poppy to milletseeds. A few days after this condition had been noted, the same conditions ensued on the soft and hard palate. This condition continued unchanged for from two to three weeks. At about the fourth week the free border of the epiglottis began to get more uneven, thick, and plump, and instead of the original soft granulated surface, a greater confluence of these granulations took place. In this manner strongly prominent and intensely injected nodules were formed. The same thing occurred in the hard and soft palate. In both localities the top of the protruding nodules underwent first an epithelial and then in a few days a deeper loss of substance, establishing ulcers. While spontaneous cicatrization would be going on in these ulcerations, fresh ulcerations would be produced in other places in the same manner. Often two or more contiguous ulcerations would coalesce into a single extensive one. This process of ulceration and cicatrization took place in the different portions of the larynx, hard and soft palate, without producing any impediment in swallowing or any other trouble. At the end of about a year, a swelling began in the anterior portion of the posterior wall of the larynx, which increased from day to day, and within five or six weeks projected into the interior of the larynx as a tumor, and covered two-thirds of the glottis, producing considerable dyspnœa at night, much slighter in the waking condition. After some cauterization with lactic acid under cocainization, to relieve the dyspnœa, the swelling underwent spontaneous diminution for a time. Treatment by lactic acid has been continued with satisfactory results, the morbid processes subsiding much more rapidly than they do spontaneously.

II. This was in a twenty-seven year old female, under Neumann's care, with primary lupus of the left conjunctiva and eyeball, with extension to the wing of the nose and upper lip. In talking to her (1877) Grossman noticed that she was hoarse, and on questioning her found she had always been hoarse. There was a large heart-shaped defect in the central portion of the epiglottis; the vocal and ventricular bands uneven, knobby, and covered moderately with granulations, with a tag of similar tissue beneath the anterior commissure of the vocal bands. No abnormality was seen in the mouth or throat, except a cicatricial distortion of the uvula. During the ensuing ten years the laryngoscopic appearance has hardly changed, but the hard and soft palate, and particularly the pharynx, have become implicated.

## CYSTS OF THE LARYNX.

In the *Annales des Maladies de l'Oreille, du Larynx*, June and July, 1887, is published a paper read by DR. J. GAREL, of Lyon, to the Société de Laryngologie, April, 1887. He reports sixteen cases out of a total of sixty laryngeal neoplasms seen by him; a proportion so largely in excess of the usual experience as to suggest the suspicion, were it not for the conclusive character of the reports, that most of them had been examples of masses of pellucid mucus adherent to the vocal bands. Attention may be called in this connection to the circumstance that cysts of the larynx have, as a rule, been found much more frequently on the right side of the body, in contradistinction to the preponderance of other neoplasms on the left side.

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LARYNGEAL POLYP REMOVED WITH THE FINGER-NAIL  
AFTER LARYNGOFISSURE.

DR. FRANZ SCHOPF (Aerz. Bericht d. öff. Bezirker-Krankenhauses in Sechshaushaus für 1875, Wien, 1886; *Semori's Centrallblatt* for March, 1887, p. 321) reports a polyp, the size of a bean, located below the glottis. Dyspnoea; tracheotomy; laryngoscopy very difficult. Laryngofissure; polyp soft, and removed with the finger-nail. Wound in larynx healed by first intention. Canula removed after a month. Voice better, but still deep-toned. Breathing free. Recovery.

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PACHYDERMIA LARYNGIS.

In the *Berliner klinische Wochenschrift* of August 8th is published a lecture by VIRCHOW on pachydermia laryngis. He calls attention to the fact that squamous epithelium covers the mucous membrane located between the arytenoid cartilages and continues uninterruptedly forward upon the vocal bands to their anterior extremities. This portion of mucous membrane, like the squamous covered mucous membrane of the mouth, pharynx, and esophagus, closely resembles the epidermoidal layers of the skin; that is to say, it possesses a more or less *cutaneous* or *dermoid* character. The dermoid portions of the larynx are not provided with glands; they have a relatively dry quality; they furnish none of the copious secretion observed in their immediate proximity; in short, they represent a domain of their own. In this region a number of processes are evolved which are not evolved in the same way on those surfaces which are clothed in the usual manner with ciliary epithelium and which possess the character of mucous membrane in its restricted sense.

There are two varieties of changes in chronic inflammatory processes in the larynx which so greatly exceed the ordinary volume of simple chronic catarrh, that they must be separated therefrom. In both varieties a greater quantity of squamous epithelium is formed. In one this is the chief change; not only quantitatively, but because the longer the process continues the more the epithelium acquires an epidermoidal character. In the other the changes occur more in the superficial layers of connective tissue, that is to say, in the mucous membrane proper. The latter produces a more diffuse swelling; the former is circumscribed in individual and usually very small points.



By virtue of the dermoid character of the affected parts Virchow has long been accustomed to group all these processes under the name *pachydermia*. Thus there are two different forms of *pachydermia laryngis*; one diffuse in which a tumefied condition of mucous membrane prevails, a relatively smooth form; the other limited to small places, more circumscribed and which he calls warty (*pachydermia verrucosa*).

The term papilloma is a misnomer and is not used by Virchow. He would gladly see it expunged from literature. As the growth is a development and hardening of the epithelium, it should properly be termed epithelioma, a term already misapplied to a certain variety of cancer. Scientifically the term epithelioma should indicate that form of tumor in which epithelium predominates, and epithelioma should be divided into the hyperplastic variety which is formed from like tissue, and the heteroplastic variety which occurs in unlike tissue. According to Virchow's view, warts of the larynx are of epithelial nature. Formerly they were called quite correctly condyloma, but this term is now otherwise interpreted in medicine and cannot, therefore, be intelligently applied. The only name which cannot be misunderstood is hard wart (*verruca dura seu cornea*).

Curiously enough these warts or papillomas have been scientifically assigned to the fibromas, but this is a great error. The connective tissue forms too little a contingent to justify the name fibroma.

Virchow's distinction between papillary warts and papillary cancer is this: He considers all these as benign, simple, local, and only superficially hyperplastic in which the sharp normal demarcation is found at the base of the epithelial layer. Any trace of epithelium in the connective tissue he regards as suspicious. Neither a flat swelling nor a papillary growth should contain anything below the boundary line which belongs to the domain of epithelial formations; all this must lie outside of and beyond the connective tissue line.

Epithelial formations beneath the boundary line he considers cancerous. It is, therefore, important to examine carefully the base of a morbid growth before it is submitted to section, and even before hardening. Otherwise spaces between the papillæ may be mistaken for alveoli with epithelial contents. If there is nothing foreign at the base of the growth, then, no matter what may be found on the free surface, it is a local formation of benign character from which nothing malignant will be developed later.

The question of recurrence has nothing to do with this examination. That recurrence may take place is fully established. A new formation may take place close to the cicatrix marking the seat of a previous growth, but by repeated removals even the last vestige may be definitively disposed of. That such warts may subside of themselves like warts of the skin has been maintained by many who believe to have seen instances. Warts on the hands have usually only a certain duration. If they remain a long time they usually drop off even when they have not been violently attacked.

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#### ACCIDENTAL INTUBATION OF THE LARYNX IN THE PASSAGE OF THE STOMACH TUBE.

DR. COUSTOUX, of Nantes, reports (*Annales des Maladies de l'Oreille, du Larynx, etc.*, July, 1887, p. 320) in detail an instance of this accident from

which he draws the inference that it would be prudent, after passing a stomach tube, to ask the patient some question so that his answer would give phonatory evidence that the tube was not in the larynx, as otherwise injections might be made which would produce suffocation.

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#### INTUBATION OF THE LARYNX.

PROF. CARL STÖRK, of Vienna (*Wiener medicinische Presse*, No. 12, March 20, 1887), speaks very favorably of intubation, and illustrates an improved instrument designed by him for introduction and withdrawal of the tube, which he considers superior to the appliance of O'Dwyer for that purpose. This instrument, an illustration of which can also be seen in the *Journal of Laryngology and Rhinology* for June, appears to be modelled on the trivalve tracheal dilator of Laborde, the middle branch being formed on three links, the terminal one of which is provided with a detachable pear-shaped extremity, and the lateral branches terminating in cup-shaped extremities then enclose it.

Interesting papers on Intubation were read at the recent annual session of the American Laryngological Association by DRs. INGALS, of Chicago, and SAJOURS, of Philadelphia (*New York Medical Journal*, June 11, 1887).

The former, whose personal experience has been extensive, called special attention to feeding patients as little as possible after intubation, and avoiding liquid nourishment as much as possible, to prevent complications from escape of food into the air-passages. This paper constitutes an excellent summary of the entire subject, and is replete with details valuable to all who may have occasion to practise the operation. Dr. Sajours' paper occupies much similar ground; but its essential feature is in the presentation of a peculiarly formed tube constructed to overcome the several difficulties occasioned by the tube of O'Dwyer, and of a special appliance for its readier introduction and removal. The discussion upon these papers cordially endorsed the method as a frequent substitute for tracheotomy.

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#### LARYNGECTOMY.

Three additional laryngectomies by HAHN, of Berlin, for carcinoma are reported by COHN (*Deutschen medicinische Wochenschrift* of June 2, p. 470), two complete and one unilateral. Of Hahn's 9 total extirpations previous to these, 2 are dead from recurrence, 1 a sarcoma, at six and four months after operation. 1, seventy-five years of age, is well seven years after operation: and another, still living, is in a condition of recurrence. Of the entire 10 cases of total extirpation, 4 died within a few weeks, 1 of erysipelas, 1 of mediastinitis, 1 of pleuritis and pulmonary gangrene, and 1 of pneumonia. Of the 4 partial excisions, 2 for carcinoma, none died from the operation. In 1 case recurrence took place within four months, and the extirpation of the larynx had then to be made complete.

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#### A MODIFIED LARYNGECTOMY.

At the recent session of the American Laryngological Association, DR. J. SOLIS COHEN, of Philadelphia, suggested (*New York Medical Journal* of June

18, 1887) that in many instances in which the larynx is removed entire, the same purpose will be equally accomplished, and with far less risk to life, by simply removing with the soft parts so much of the anterior wall of the thyroid cartilages as is necessary to insure the complete removal of the respiratory contingent, leaving the wings of the thyroid cartilages almost intact and with their anatomical connections undisturbed.

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#### ANEURISMAL PRESSURE ON PNEUMOGASTRIC AND RECURRENT LARYNGEAL NERVES.

DR. DAVID NEWMAN, of Glasgow, in a lecture on some points in relation to the Diagnostic Significance and Therapeutic Indications of Laryngeal Symptoms resulting from pressure of aneurisms upon the vagus and recurrent laryngeal nerves (*British Medical Journal* of July 2, 1887, p. 1) describes four cases from the records of which he desired to show: *First*, that aneurism of the aorta and innominate artery may exist and give rise to laryngeal symptoms only; but in most instances, on critical examination, certain collateral signs may be made out sufficient to warrant one in forming a positive diagnosis, or to give rise to a very strong suspicion of an intrathoracic tumor. *Second*, that in the early stage pressure may cause paroxysms of most urgent dyspnoea, accompanied by laryngeal stridor and paroxysmal cough. *Third*, that at a later stage paralysis occurs usually, but not always, limited to one side, characterized by phönative waste of breath and imperfect cough, but without dyspnoea, except when reflex spasm is indicated on the opposite side, or when pressure-stenosis is caused by the aneurism. *Fourth*, that in certain cases tracheotomy should be performed, not only to prevent impending death from asphyxia, but also as a remedial measure.

The recommendation of tracheotomy as a remedial measure in cases in which the paroxysms of dyspnoea are due to laryngeal obstruction and not to actual pressure on the trachea, is mainly based upon personal experience, clinical and pathological, to the effect that in a large number of cases of aneurism death by hemoptysis is preceded by threatenings of laryngeal suffocation, while the rupture of the sac has in many cases been directly caused by the spasmodic attacks of dyspnoea.

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#### TOPICAL MEDICATION OF THE TRACHEA AND BRONCHI.

DR. MAX SCHAEFFER, of Bremen (*Monatsschrift für Ohrenheilkunde*, etc., No. 4, 1887), has noticed the similarity of asthmatic dyspnoea with that produced by the introduction of medicaments into the trachea. The patients think they do not have enough air in the lungs, and make inspiratory efforts in consequence; and then, when the trachea and bronchi become overfilled, they swallow air into the stomach. The compressed air in the trachea and bronchi excites spasm of the glottis by irritating the inferior surface of the vocal bands. The patient springs up with cold perspiration on his face, and clutches his throat anxiously. Finally the irritation on the vocal bands becomes too great, the bands separate by mechanical pressure, most likely, and the air escapes noisily from trachea and bronchi, and then from œsophagus and stomach. With crackling eructation the patient experiences relief, and



a deep inspiration convinces him that he is not going to choke to death. Schaeffer's success with electrization in asthmatic paroxysms led him to treat spasm of the glottis, from introduction of medicaments, in the same manner. He places the electrodes of a strong current of induction upon both sides of the larynx, and controls the spasm at once. Believing that such spasm is more or less an expiratory dyspnoea, he endeavors to prevent its occurrence by the following method of manipulation: The patient is to take a deep breath while the mirror is being placed in position; he is made to say *eh* while the insufflator or syringe is being introduced; and then the medicament is propelled during an inspiratory phase of a quiet respiration. With children, he applies powders through the nose during an inspiration with the mouth closed, and these powders reach at least the upper portion of the trachea.

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CARCINOMA OF THE THYROID GLAND, AND ITS TYPICAL ANATOMICAL COURSE.

An autopsical study of a carcinomatous tumor of the thyroid gland has led Dr. D. AIGRE, of Boulogne-sur-Mer (*Revue Mensuelle de laryngologie*, etc., June, 1887, p. 304) to some shrewd clinical and anatomical observations which merit abstract with some detail. The tumor in question involved the left lobe, which passed completely around the pharynx and œsophagus, in front of the prevertebral connective tissue, and rejoined the extremity of the healthy right lobe. Slight involvement of the trachea existed in the form of two small hernia-like polypoid productions at the anterior segment of the third ring. The œsophagus was pushed curvilinearly considerably to the right, its external surface being inseparable from the tumor and involved in its substance, presenting interiorly a limited circle of softened mucous membrane, with slight inequalities and numerous anfractuositities and one partially detached pear-shaped excrescence the bulk of a small nut. The left carotid was slightly displaced, but otherwise normal. The primitive left jugular was distended to the size of a little finger, and filled with readily detachable neoplastic tissue similar to that of the tumor; and one of the thyroid veins was similarly enlarged and filled with the same kind of tissue. The right recurrent laryngeal was normal; the left one could not be traced beyond the inferior limit of the tumor.

In studying the features of this case in connection with six others reported in literature since the publication of Krishaber's monograph in 1882 (*Annales Mal. de l'oreille du larynx*, etc., Nov. 1882), Dr. Aigre finds some errors and some omissions in the classic descriptions given by general authors. Thus, as to the precocious acute pains irradiating along the neck and upper limb, believed to be sufficiently constant to constitute an important element in differential diagnosis, they were affirmed to be absent in three of the seven alluded to, and not mentioned at all in the accounts of the other four. Instead of death by the cancerous cachexia, as described by general authors, death, in these seven cases, took place three times by dyspnoea, once by dysphagia, once by repeated hemorrhage, and once by intercurrent nephritis. It appears that the thyroid gland shares with its neighboring organ, the larynx, an immunity, as a rule, from carcinomatous generalization.

Though obliteration of the primitive jugular vein is so frequent as to be

almost always cited, there is no record of any phenomena of cerebral stasis due to obstruction to the blood-current; nor is there any mention of abnormal development of the anterior jugular or the vertebral, which act as compensators, without enlargement.

The encircling of the trachea and œsophagus, so frequent in these tumors, and the easy separation of the mass from the other tissues with which it is in immediate relation, struck Dr. Aigre as typical, and led him to make some anatomical investigations which confirmed the special description of the connections of the thyroid gland given by Sappey, but by no other anatomist, and which, in his opinion, accounts for the peculiarities in the course taken by the cancerous thyroid. Aigre's researches on cadavers of different ages, sexes, and plumpness, gave uniform results, as follows: The thyroid gland being exposed enclosed in its capsule, it is found very easy to isolate the vasculo-nervous mass with which it is in relation by an intermediate layer of connective tissue, and thus to get down to the prevertebral aponeurosis. From this aponeurosis the œsophagothyroidean mass can be readily separated with the handle of the scalpel. This separation being made to a certain extent, the thyroid gland, the trachea, and the œsophagus can be removed *en masse* by means of two transverse sections, one above the hyoid bone, the other at the level of the sternal notch. If this mass be turned over and a vertical incision be made in the middle line of the posterior face of the œsophagus, a thin fibrous membrane may be lifted with the forceps and be detached from the longitudinal musculature of the œsophagus, and then be dissected off on the two sides as far as the posterior border of the lobe of the thyroid. At this point the fibrous layer doubles to envelop the proper tissue of the thyroid gland in continuance with its fibrous capsule. This disposition of the layers of connective tissue controls, according to Aigre, the direction followed by the neoplasm.

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## DERMATOLOGY.

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UNDER THE CHARGE OF

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### THE ETIOLOGY OF IMPETIGO, FURUNCLE, AND SYCOSIS.

According to the investigations and interesting experiments of BOCKHART (*Monatshefte für praktische Dermatologie*, No. 10, 1887), the diseases known as sycosis, furuncle, and impetigo, are due to the same cause—the presence of

the *Staphylococcus pyogenes aureus* and *albus*. In every case of these diseases the author was able to find these micrococci in great numbers. In some, though few lesions, one only of the two above varieties was found, while in most instances the two were indifferently present. In personal inoculations the results were in accordance with the clinical investigations.

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#### LEPROSY AND VACCINATION.

In the *British Medical Journal* of June 11, 1887, GAIRDNER reports two cases of leprosy, both of which were apparently consequent upon inoculation through vaccination. A physician, practising at a well-known endemic seat of leprosy, vaccinated his son with the crust obtained from a healthy child in a leprous family in whom leprosy subsequently showed itself. Using his own child as a *vaccinifer*, he vaccinated the child of a Scotch sea-captain. Later his own child exhibited symptoms of the disease, in a mild form, while the son of the sea-captain developed the disease in its rapid and worst type.

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#### PRURITUS HIEMALIS.

PAYNE reports (*British Medical Journal*, May 7, 1887) several cases of the more severe type of this affection, and adds his experience on the subject of treatment. Unfortunately the disease is difficult to manage, and usually palliation only is to be anticipated. The underwear should be soft and un-irritating; soft, pure woollen should be worn; not the coarse, rough, irritating woollen mixtures which are generally sold. The skin should be protected by an oily or viscid lubricant. This permeates the epidermis and makes it a more perfect non-conductor, and the cutaneous nerves are thus better shielded against temperature variations. The author has had best results with glycerin lotions. Internally chloral was occasionally administered at night.

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#### NAPHTHOL.

Attention is again directed (*Medical Record*, May 21, 1887) to the use of naphthol in cutaneous diseases by ALLEN. The preparations known as beta-naphthol and hydronaphthol were employed, and the author considers that the effects are therapeutically the same. Good results were obtained in the dry and scaly forms of eczema, especially in eczema of the scalp. In scabies the author is able to corroborate the favorable reports of Kaposi and Van Harlingen. It acted well also in pruritus, pityriasis capitis, pediculosis capitis, tinea tonsurans, and alopecia. In two cases of alopecia areata its favorable effect was noticeable; in one case the naphthol crystals were rubbed into the patch, in the other the remedy was applied as a ten per cent. ointment. In other affections of the skin than those above named, naphthol showed no special influence. The drug was employed usually in an ointment with vaseline, lard, or lard and lanolin in the strength of five to sixty grains to the ounce. In collodion it acts well in psoriasis, trichophytosis, etc. It may also be applied, when indicated, in powder with starch, Fuller's earth, and similar substances. In regard to the possibility of danger from absorption, the author concludes, from his experience, that if a pure article is used no bad effects will occur.



# ICHTHYOL AND RESORCIN: A CLINICAL STUDY OF THEIR EFFECTS.

JACKSON contributes (*Journal of Cutaneous and Genito-Urinary Diseases*, June and July, 1887) his experience in the use of these two remedies. Ichthyol (ammonio-sulphate) was employed and its effects followed up in 3 cases of rosacea, 8 cases of eczema, 6 cases of acne, 1 case of sycosis, and 3 cases of ulcers. In rosacea, in 2 cases the effect was negative; in the third case the disease was aggravated. Of the eczema cases, 4 were made worse, 2 were uninfluenced, 1 greatly benefited, and 1 temporarily improved. (In these last cases, the ichthyol was prescribed in Lassar's paste.) Of the acne patients, 1 was cured (bromide of arsenic was given by the mouth), 2 made worse, 1 temporarily benefited, 1 improved, and in 1 no effect. In the case of sycosis, the disease was aggravated, and the same may be said in regard to the 3 cases of ulcers in which it was used. In the above cases the remedy was prescribed externally, in ointment, with vaselin or lard, in strength varying from three to thirty per cent.—the weaker strength being used in the eczema cases. In some cases, also, the remedy was prescribed by the mouth in addition to its use externally. The author passes the following judgment: Ichthyol is an unreliable preparation when used alone; in some cases it is of apparent benefit when exhibited as an adjuvant, but it is not so good as many other old and well-approved remedies.

In the use of resorcin the writer was able to follow out its effects in 6 cases of eczema, 3 of epithelioma, 3 of scrofuloderma, in 1 of lupus erythematosus, 1 of lupus vulgaris, and 1 of psoriasis. In eczema it was prescribed in ointment and glycerine, two to twelve per cent. strength; 1 case was cured, 2 improved, and 3 aggravated. In epithelioma, in five to fifty per cent. ointment, all (3) the cases were improved, 2 healing completely, although later one of these showed a return at the edge of the patch. In the 3 cases of scrofuloderma, in ten to twenty per cent. strength, improvement was noted, in one a cure taking place; in these cases arsenic and iron were taken by the mouth. In the case of lupus erythematosus, under the use of a twenty per cent. resorcin ointment, the disease rapidly improved; phosphorus was given internally. In the case of lupus vulgaris (non-ulcerating), constant improvement was noted. In the patient with psoriasis, the first effect was favorable, but later the remedy exerted no influence. The writer summarizes his experience with resorcin as follows: Resorcin is an irritating substance for use in eczema, though at times it may prove very efficient in chronic cases where active stimulation is indicated. It exerts a powerful absorptive effect on new cell infiltrations. It is a useful addition to our list of remedies for the treatment of epitheliomatous lesions where surgical procedures are contraindicated from any cause.

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## HERPES DIGITALIS.

Under this name, BLASCHKO describes (*Deutsche medicinische Wochenschrift*, No. 27, 1887) a case of a peculiar recurrent herpetic eruption occurring on the index-finger of the right hand. The eruption was confined to this part, and consisted of grouped vesicles upon a slightly inflamed base. A few days before an outbreak there is more or less neuralgic pain in the affected finger

and back of the hand. The vesicles are deep-seated, and form elevations the size of a split pea. There is at first slight burning, and, later, increasing itchiness is a noticeable symptom. There is no tendency to rupture, the thick unyielding wall of the lesions preventing this termination; nor is there, as a rule, any tendency to spontaneous involution. If the lesions are not soon punctured and emptied, a lymphangitis, extending up the arm, with painful enlargement of the axillary glands, results. The contents of the lesions are usually clear, becoming cloudy if of long duration. This process has recurred for the past two years, at first three or four months intervening, but later at intervals of six or eight weeks. The number of lesions present in the different attacks has varied from two to fifteen. The duration of an attack depends, to a great extent, upon the number of vesicles, averaging about two weeks. There was no scarring. The writer regards the disease as probably belonging to the trophoneuroses.

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#### A CASE OF CHRONIC DYSIDROSIS OF THE FACE.

ROSENTHAL reports (*Deutsche medicinische Wochenschrift*, No. 20, 1887) a case of dysidrosis, or sudamen, of the face occurring in a woman, aged fifty-four. The disease has lasted nine years, becoming worse in the summer season. The lesions appear as small, solid bodies in the skin, in appearance not unlike milia. On examination, however, they were found of a vesicular nature; the contents clear and of an acid reaction. A few vesicles contained minute blood coagula, due, the writer considers, to external traumatic agency. There was neither scaling nor crusting. Lesions appeared to last almost indefinitely; disappearing always by absorption. The application of a one to two per cent. alcoholic solution of naphthol was found useful.

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#### ERUPTION FROM INTERNAL USE OF ARSENIC.

DR. LEONTOWITSCH (*Monatshefte für Prak. Derm.*, No. 12, 1887) reports a case of eruption from the internal use of Fowler's solution occurring in an old lady, the dose being a small one, twice daily, administered for the relief of obstinate chills and fever. On the second day, severe itching manifested itself on the neck and chest; on the third day, a small macular red exanthem appeared upon the above-mentioned regions, the skin being slightly swollen and the seat of intolerable itching. By the fifth day it had spread over the abdomen. Upon discontinuing the remedy the cutaneous symptoms disappeared in three or four days, but were reproduced as before on taking the arsenic a second time. It was subsequently shown that while the patient could not tolerate either arsenite of potassium or arsenious acid with bromide of potassium, arsenite of quinine caused no unpleasant symptoms. An idiosyncrasy was supposed to exist.

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#### ON THE CONTAGIOUSNESS OF TINEA VERSICOLOR.

HUBLÉ (*Annales de Derm. et de Syph.*, No. 6, 1887) has recently made some researches upon tinea versicolor, its transmissibility, and its consequences in

judiciary medicine. Kaposi has denied its contagion, and Hardy has stated that it is but slightly contagious. Hublé protests against these views and cites nine cases of contagion, from man to woman, or *vice versa*. He mentions, moreover, two cases of mediate contagion through the means of flannel undershirts. The author gives his experience with inoculation. In the first series of experiments scales scraped from a patch of disease were simply applied to the skin, with negative results at the end of thirty days. In a second series of experiments the skin was rubbed until red, and the scales were applied to the surface by means of glycerine and plaster, positive results appearing at the end of two weeks. In a third series in one spot the scales were removed with a lancet, and in another region the exfoliating epidermic scales were simply wiped off, and the tinea scrapings were applied by means of glycerine and gold-beater's skin; in both places evidences of the disease were soon (in a few weeks) visible.

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A CASE OF PEMPHIGUS CURED BY APPLICATIONS OF  
OLEATE OF MERCURY.

CRIPPE (*British Medical Journal*, January 29, 1887) gives the notes of a case of an extensive pemphigoid eruption (*Dermatitis herpetiformis*?—EDS.) of several months' duration, in which inunction of the oleate of mercury seemed to bring about a cure. Blebs were present in large numbers, although at times the eruption was of a multiform type. When first seen small doses of arsenic were prescribed, and a five per cent. oleate ointment applied to one arm. The eruption on general surface remained unchanged, but rapid improvement was noted to occur on the part to which the oleate had been applied. Later the same ointment was gradually prescribed for the whole surface and with the same favorable result. A cure was effected in seven weeks.

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THE PATHOLOGY OF LICHEN RUBER.

Since 1880, KÖBNER (*Berliner klinische Wochenschrift*, Nos. 20\* and 21, 1887) has treated fifty-two cases of this disease. Of this number only two were of the serious type described by Hebra. The author recognizes, as do most writers, two varieties of the disease—lichen ruber acuminatus, and lichen ruber planus—and in his experience the latter type is by far the more frequent. The writer finds, from numerous examinations, that this disease has primarily its beginning in dilatation of the bloodvessels and perivascular cell-infiltration in the upper part of the corium in the papillæ, and along with this is noticed rapid growth of the rete; but involvement of the hair follicles or sweat-glands, which is referred to by most writers, was found to be inconstant and incidental. Careful examination for bacilli gave negative results. The author's cases tended to prove the neurotic origin of the disease. Arsenic was the remedy which gave good results. Unna's ointment was found valueless.



## MIDWIFERY AND GYNECOLOGY.

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 UNDER THE CHARGE OF

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 MASSAGE IN GYNECOLOGY.

PROFENTER (Braumüller, Wien, 1887) here considers the effect of massage in subacute and chronic inflammatory processes in the female pelvis. In a short preface Prof. Schultze, of Jena, states that he has tested the results of the method and found them good, and he believes "that the method of Brandt gives valuable results in stretching and slackening old parametric exudations, as well as restoring fixation in prolapsus uteri." He point out, also, that the treatment requires very accurate diagnosis as well as great expenditure of time. In the introduction Profenter gives the history of the application of the method. It is due to a Swede, Brandt, who was not a medical man, and who, apart from professional instruction, gained much insight into pelvic disorders. In 1847 he treated prolapsus recti in a soldier by rubbing up, as it were, the sigmoid flexure. He next turned his attention to prolapsus uteri, and cured, it is said, three cases in a few weeks. The method was then extended to retroflexed and fixed uteri, chronically inflamed ovaries, and chronic cellutic and peritonitic adhesions, all with good results. Profenter studied Brandt's results for a week, found them good, and had his scepticism removed. Cases are then recorded. Of these a selection is appended. It must, of course, be noted that the massage is local and bimanual, and is not to be confounded with the general massage of the body practised in Weir Mitchell's treatment.

*Case 1. Chronic parametritis posterior, chronic ovaritis, and slight cystitis.* Oct. 23, patient has pain on urination. Bladder washed out from October 24th to November 10th: rest in bed; alterative tampons also tried.

November 18th, *status præsens* as follows: Movement of the uterus to the front restricted; left uterosacral ligament shortened, thickened, and painful on pressure; left ovary slightly painful on pressure. The treatment consisted in systematic stretching of the shortened ligament, and massage of the left ovary. On December 4th, the uterus had its fundus to the left of the median line, and movement, even to the neighborhood of the symphysis, was painless.

*Case 12. Chronic parametritis and perimetritis.* Condition under narcosis: Marked induration of the broad ligaments. The patient complained of pain of the left side and head; pain on micturition and defecation, with hysterical attacks eight days before menstruation. By massage the exudation disappeared, and the uterus and ovaries became normal.

*Case 16* was one of complete prolapsus uteri. The uterus was replaced and anteflexed according to Brandt's method, and apparently cured in a month.

[Massage has often been recommended in text-books, especially for old inflammatory exudations. Freund has also recommended it in such cases, and

it is undoubtedly worthy of trial. Schultze's recommendation is of high value as he is known as one of the most careful observers of chronic inflammatory exudations, and his work on their relation to uterine displacements is of the greatest value. One is inclined to doubt the value of massage in prolapus uteri most].

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#### INSANITY AND OÖPHORECTOMY.

LESZYNSKY (*N. Y. Med. Journ.*, June 25, 1887) gives an account of two cases in which oöphorectomy was performed for insanity. While he admits that we may have reflex irritation from a diseased uterus or ovary, he points out the preponderance of psychical causes and criticises the practice of oöphorectomy in the insane, alleging that "the premature and indiscriminate removal of the ovaries in cases of insanity and other neuroses, has of late become so frequent and flagrant a procedure as to demand an emphatic protest against such reprehensible measures, and such illegitimate practice."

Leszynsky would only advise oöphorectomy when a distinct pathological condition was present, and had a preponderating influence. The effect of septicæmia in mania is well known. Clouston, in his *Mental Diseases* (London, 1883) says, "I believe that some day we shall hit on a mode of producing a local inflammation or manageable septic blood poisoning, by which we shall cut short and cure attacks of acute mania." (Op. cit., p. 190.)

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#### ON EXTRAPERITONEAL EXTIRPATION OF THE UTERUS.

FRANK (*Arch. f. Gynäk.*, Bd. xxx. Heft 1) describes a series of extraordinary cases where he performed what he terms extraperitoneal extirpation of the uterus. In this paper he does not detail his method specially, but he evidently in certain cases, by a process of enucleation, removes the greater part of the uterine substance without opening the peritoneal cavity—*i. e.*, he leaves the peritoneum intact. The summary of his chief cases fully justifies the term "tumor operations," applied by Stratz (*Centr. für Gynäk.*, April 23, 1887). In regard to risk of bleeding, Frank alleges that the traction on the uterus hinders it. The suturing of the peritoneal folds also checks it, and, if necessary, ligatures can be passed up as far as the Fallopian tube angle, so as to control the ovarian artery, or iron solutions can be applied.

Frank alleges that the enthusiasm for total extirpation of the uterus is greatly diminished. When the disease has advanced so far as to affect the body, the parametrium is sure to be infiltrated too. He advocates his operations not so much in carcinoma as in old adherent displacements, pruritis uterinus, and adenomatous degeneration.

One could understand this operation in certain cases of carcinoma uteri. Marion Sims, in one of his last papers, records a case of carcinoma uteri where he curetted thoroughly, so that he could have inverted the thin peritoneal sac of the uterus and ligatured it. He did not do so, and adds that he nearly performed a brilliant operation (quoted from memory).

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#### ON A CASE OF SPONTANEOUS INVERSION OF THE UTERUS.

DR. N. T. BRENIS (*Edin. Med. Jour.*, July, 1887) records a case of spontaneous inversion of the uterus, following the expulsion of a fibroid polypus.

The remarkable feature in the case is that, after attempts at manual reinversion had failed, reinversion was brought about by the repeated use of the hot douche. He considers that the hot water acted by lessening the bulk of the organ, and bringing about contraction of the longitudinal fibres, with widening of the constricting ring.

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#### THE APPLICATION OF COCAINE IN PLASTIC GYNECOLOGICAL OPERATIONS.

KÜSTNER (*Verh. der deutschen gesellschaft für Gynäk.*, Erst. Koupres, 1886) considers here the effects of cocaine as a local anæsthetic in some of the plastic operations in gynecology. Fränkel limits the use of cocaine to short operations, only to those needing merely an incision or scissor's cut; while Schramm would employ it in all plastic operations. Küstner takes an intermediate position, and thinks the value of cocaine can best be estimated by trying it in painful plastic operations, viz., those at the posterior commissure. He tried it, therefore, in 42 operations, as follows: 5 posterior colporrhaphies, 31 partial plastic operations in the perineum, 4 total plastic operations in the perineum, 1 hymen excision, 1 cyst excision on the left side of the vagina.

The parts to be operated on were first disinfected, and then repeatedly brushed with a 20 per cent. solution until the mucous membrane was somewhat pale. Poisoning never occurred. The results were as follows: In 8 cases, bad; the patients complained of great pain; in 23 cases it worked well, and in 10 there was complete anæsthesia. Küstner recommends cocaine strongly in plastic operations.

[Cocaine cannot replace general anæsthesia, as we must remember that the patient is still conscious in cocaine operations. What most women in this country object to is not only the pain but the exposure, and results such as Küstner's would cause mutiny in an English hospital.]

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#### THE CONSTITUTIONAL TREATMENT OF PUERPERAL SEPSIS.

RUNGE (*Arch. für Gynäk.*, Bd. xxx. Heft. 1) here gives the results of the form of treatment he recommends in puerperal septicæmia. This consists in the administration of large doses of alcohol, the use of tepid baths, and abundant nourishment, with abundance of antipyretics. He holds further, that as the disease goes on the body becomes more capable of resisting, and points out that while local treatment can limit further entrance of the poison we can do nothing against what is already absorbed. One must, therefore, strengthen the resisting powers of the organism. The alcohol lessens the destruction of albumen in the body, and hinders cardiac failure, while the baths help digestion, and increase appetite. They are not used to keep down temperature. The temperature of the water should be 72°-75° F., and the bath should last for five to ten minutes. Collapse can be prevented by alcohol.

Three cases are narrated with one death.

[Runge uses local treatment, too, and therefore the treatment he recommends is what most men would employ in this country, with the exception of the tepid baths, which seem dangerous and troublesome, unless for reduction of high temperature. There are better means of improving the appetite and heart than this.]



## ON PLACENTA PRÆVIA.

BAYER (*Verhandlungen der deutschen Gesellschaft für Gynäkologie*) advances a new theory of placenta prævia cases, in order to harmonize them with opening up of the cervical canal during the later months of pregnancy. The following is a *résumé* of his views:

He first states Matthew Duncan's view in regard to the hemorrhage in placenta prævia. According to Duncan, the lower portion of the uterus forms in advanced pregnancy a part of half a sphere, of which the internal os is a pole. During labor this segment of a sphere becomes converted into a cylinder with consequent dilatation of the placental site and separation of the placenta. As the normally placed placenta is separated (according to Bayer and others) by uterine retraction which arrests bleeding during the separation, the bleeding in placenta prævia is caused by the expansion of the lower uterine segment. Of course, during this expansion the internal os also opens up. As Duncan holds that the internal os only opens up during labor, he logically holds any bleeding during pregnancy as accidental.

Since Duncan's paper was written, the development of the lower uterine segment has become known as the development of a special zone between the contracture ring and Müller's ring. The development of the lower uterine segment (from the cervical canal) explains, according to this writer, the bleedings in placenta prævia during pregnancy.

Bayer then considers the opinions of those who hold that the lower uterine segment is derived from the uterus by stretching and thinning. If the placenta is inserted over the os internum, it must, as growth of the segment goes on, either be separated or grow with it. As the lower uterine segment does not take part in uterine retraction, but is, as it were, in a condition of paralysis; and as, if uterine, its circulation must be abundant, fatal hemorrhage should take place during placental separation.

Bayer then states his opinion that the presence of the placenta in the lower uterine segment is an impossibility, at least for those that end favorably. In the uteri he has examined, he has never found the placental site below an evident contracture ring or in a properly formed lower uterine segment.

Bayer alleges that the idea of the cervical canal opening up in some cases and its remaining intact in others, explains the clinical features of placenta prævia as well as the anatomical relations he has observed.

From observations of about 20 cases, he asserts that defective development of the supravaginal portion in the cervix is a typical occurrence in placenta prævia, that in the worst cases the internal os remains intact until labor begins, and that a lower uterine segment does not, therefore, develop. When the placenta dips near the os internum, Bayer believes that if the cervix open up to form the lower uterine segment, the placenta will thus be carried out, as it were, from the dangerous area when the placenta covers the os internum. Bayer holds that the cervical canal may not open up, that these form the cases where we have no bleeding until the full time; in others, he holds it does open up and we, therefore, have bleedings during pregnancy which leave traces in the placenta and membranes there. In his cases these changes were found in the placenta, in only the latter class.

A CONTRIBUTION TO THE ANATOMY OF THE POST-PARTUM UTERUS, WITH  
SPECIAL REFERENCE TO PLACENTA PRÆVIA.

HART (*Edin. Med. Journ.*, July, 1887) describes the relations of the anterior uterine wall in a woman with placenta prævia, who died immediately after delivery. The placenta was attached to the anterior uterine wall, and it was, therefore, examined by the microscopic sections, so as to ascertain the various relations of peritoneum, cervix, etc. He found the cervical canal  $1\frac{1}{2}$  inches long, with a distinct os externum, and a distinct upper limit to it. Between the thick retracted wound and this upper limit of the cervical canal, was a thinner portion, with peritoneum separated, and with placental remains in its upper half. This he believes to be the lower uterine segment.

He therefore asserts that this preparation shows these portions of the uterine wall: 1. A thickened retracted portion, with peritoneum adherent. 2. A thinner portion, with peritoneum separated—lower uterine segment. 3. Cervical canal. He believes that the placenta should be defined as prævia, when attached in part to the lower uterine segment, and that it is separated during labor by the expansion the lower uterine segment then undergoes. He holds that the peritoneum over the lower uterine segment is separated in the same way, and that the diminution in area occurring about the contraction ring can only separate the placenta. He therefore alleges that he has demonstrated what Bayer terms a "physiological impossibility," viz., placenta in lower uterine segment.

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INTERNAL PUERPERAL ERYSIPELAS.

WINCKEL (*Verh. der Deutschen Gesellschaft für Gynäk.*, 1886) first alludes to a previous communication given by him at Munich on puerperal erysipelas, where he pointed out that the spread of erysipelas took place through the lymphatics of the vagina, uterus, and pelvis, with those of the abdomen and chest; that in all lymphatic forms of puerperal fever we must seek for chain micrococci in the exudations, in the pleura, peritoneum, and in the joints. He pointed out further, the frequency of pneumonia in puerperal erysipelas, and urged that we have in it a poison different from that of puerperal fever. Gusserow also holds the same opinion in relation to puerperal fever and erysipelas.

Winckel now gives a more complete research on this interesting subject. In January, 1886, a patient was admitted to hospital with a parametric exudation, suppurating, and passing through the ischiatic notch. Aspiration of this with a purified Pravaz's syringe gave pus which contained the erysipelatous micrococci of Fehleisen. A pure cultivation of them was obtained, and erysipelas conveyed to a rabbit by it. On February 27, 1886, a primipara was delivered normally. The pulse, however, was high on Winckel's first visit (120), and remained above 100 for the next two days, there being no elevation of temperature; on the evening of the third day the temperature was 100° F.; next morning, 102.5° F., and pulse 144. Pressure on the uterus caused a flow of badly smelling lochial secretion. On the posterior commissure, fourchette, and the inner surface of the left labium minus, was a puerperal

ulcer. During the night there were great pains in the abdomen, and there developed peritonitis, with erysipelas on the nates. Her after-condition was briefly as follows: February 7th, midday—pulse 128, dicrotic; temperature 102° F.; respiration 42, and superficial. Pains felt over sacrum and epigastrium. There was impairment of percussion noted over the bases of both lungs, but no cardiac murmurs. Tympanites was very great, and fundus uteri two finger-breadths above symphysis. The spleen was enlarged, the sacral regions erysipelatous; no œdema or other change in the legs. Left labium minus swollen, ulcerated; discharge slight and mucopurulent. Bladder contained nearly a pint of clear urine, and the lips of the cervix uteri were covered with croupous exudation passing into the cervical canal. It was impossible to make out any parametric exudation separate from the peritonitic one.

*Diagnosis.*—Erysipelas of nates; vulvar ulcers; metrolymphangitis; diffuse fibrinous peritonitis.

*Prognosis.*—Bad.

The patient went on from bad to worse, the lung-mischief increased, with sickness and abdominal pain. Death took place on the forenoon of February 9th. Before the body had cooled, blood was aspirated from the right side of the heart for examination as to microorganisms.

On *post-mortem* examination the following conditions were found: Diphtheroid superficial defect at vaginal entrance; diphtheroid endometritis; superficial necrotic metrolymphangitis; purulent salpingitis of the outer tissue of the right tube; right-sided ovaritis; diffuse purulent peritonitis, with considerable mucopurulent and hemorrhagic exudation; undoubted cloudy swelling of the sub- and retroperitoneal connective tissue; double pleurisy (beginning) with spread to diaphragm and purulent affections to subpleural lymphatics in part.

Marked swelling of the intestinal tract was also present, with marked anæmia of the abdominal organs.

The uterus was barely the size of a man's fist, with purulent points in its walls. The uterine cavity was the size of a hen's-egg, and contained about a teaspoonful of dirty reddish-brown fluid. The placental site had been on the anterior wall, and on section there, spongy and purulent foci were seen. The pleural sac contained a little cloudy, grayish-red fluid; anterior mediastinum had œdematous swelling, and there was some fluid in the pericardium.

The blood taken shortly after death from the right side of the heart was found to contain Fehleisen's micrococci; these were cultivated, and when inoculated into a rabbit's ear gave it erysipelas. Erysipelatous micrococci were also found in the peritoneal and pleuritic exudations. They were also cultivated from spleen, lungs, uterus, kidneys, liver, and heart-muscle. Microscopic examination of the organs gave diplococci, as well as chain cocci. The kidneys contained many micrococci colonies.

Inoculation experiments on animals gave further proofs, but rabbits, guinea-pigs, and rats showed less reaction than white mice, which, after inoculation, showed severe general symptoms, dying in periods varying from six hours to seven days. Alcohol was found to inhibit the growth of the micrococci, but liquor ferri sesquichlorati was found fatal to them.



The following is a summary of the chief points in this most valuable paper:

*a. Clinical points.*

1. The most frequent originating points in five-sevenths of all puerperal erysipelas cases are the genitals and nates—Hugenberger, 13 out of 15; Gusserow, 7 in 14; Winckel, 30 in 42.

2. Primiparæ are affected three to four times more frequently than multiparæ.

3. Puerperæ with vulvar wounds are specially predisposed:

4. Severe operative cases are affected more frequently than others.

5. The children of erysipelalous puerperæ remain erysipelas-free.

6. The greater the number of severe puerperal fever cases, the greater the number of erysipelalous ones.

*b. Bacteriological points.*

7. In pus from a parametritis (Case 1) and in all the organs and tissues of a fatal case of puerperal erysipelas, were the characteristic erysipelas cocci found.

8. The cultivations gave positive results agreeing with those of Fehleisen.

*c. Points made out by experiments on animals.*

9. Erysipelas was caused in different animals by cultivations of erysipelas cocci, obtained from the tissues of the puerperæ who died.

10. By injections of these cultures inflammatory affections were obtained.

11. In the blood and organs of the animals so infected the cocci were found.

12. As in the case of other microorganisms, different animals reacted differently to the cocci. The most easily poisoned are white mice.

Winckel uses the term internal puerperal erysipelas. For puerperal sepsis, he suggests, "spaltpilzvergiftung," and for internal puerperal erysipelas, "erysipelatöse spaltpilzvergiftung."

[This paper is an important one, inasmuch as it is an investigation in which Koch's cultures for microorganisms causing a disease, are fully demonstrated. It also seems to follow that infection takes place by touch—hence the importance of purified hands.]

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#### CATTLE-HORN LACERATIONS OF THE ABDOMEN AND UTERUS IN PREGNANT WOMEN.

HARRIS (*American Journal of Obstetrics*, July, 1887) gives here the known cases of cattle-horn lacerations of the pregnant uterus in women. The remarkable fact comes out that the results as to the mother's life, of what may be termed "bovine Cæsarean section," are better than those obtained by surgeons, unless in quite recent times. The bad results obtained by tumor operators in Great Britain and America he quite rightly attributes to delay in operations and to useless and hurtful trials to deliver by craniotomy. Thus the record of Cæsarean operations performed by medical men in the United States for the last seven years is not so good as in bovine Cæsarean section, the former having a mortality of nine in eleven cases, the latter of four in nine.

## MEDICAL JURISPRUDENCE AND TOXICOLOGY.

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 UNDER THE CHARGE OF

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## RUPTURE OF THE UMBILICAL CORD AT BIRTH.

P. BUDIN (*Annal. d'hyg. publ.*, ser. 3, t. xvii. pp. 534-540, 1887) has communicated to the Société de Médecine légale de France, a paper on this subject, in which, after briefly reviewing a few cases of this kind, he details two cases of his own, which happened recently within the Charité. The one was that of a woman, aged twenty-nine, who had previously borne a child, and who after admission to the Charité, and while lying in bed, expelled a mature and living fœtus, with such force that the cord was ruptured at a point about four inches from the umbilicus. The child, which weighed  $6\frac{1}{2}$  pounds, survived. The cord was seventeen inches long. The other case was that of a primipara, aged twenty-seven, who about the end of the eighth month of pregnancy, was delivered of a child, which, as in the previous case, was expelled with such force that the umbilical cord was torn across near to the umbilicus, although the woman was lying horizontally in bed. The child weighed  $5\frac{1}{2}$  pounds, and the length of the cord was fifteen inches. The child survived. These cases are interesting to the medical jurist as being extremely rare.

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## DETECTION OF SPERMATOCYTES IN SPERMATIC STAINS.

UNGAR (*Viertelj. f. gerichtl. Med.*, N. F., Bd. xlvii. S. 316-327) now gives the results of a somewhat elaborate investigation of the agents most suited for staining spermatozoa, and thus revealing their presence. He describes several methods of staining, by which he has obtained good results. He begins by placing a small piece of the cloth stained with spermatoc fluid in a watch-glass containing distilled water, to which a minute quantity of hydrochloric acid has been added (1 drop to  $1\frac{1}{2}$  ozs.). The acid prevents the spermatozoa swelling up and breaking. Maceration is allowed to continue for one to ten hours, depending on the freshness of the stain. The cloth is now removed and stripped, and the strippings, as also the macerated fluid, placed in a thin layer on a number of cover-glasses. The fluid is then dried on the cover-glasses by passing them three times quickly through a flame. The dried residue is now stained by placing the cover-glass in a watch-glass containing staining fluid. The author has found a process of double-staining the best. For this purpose he employs a combination of eosine and hæmatoxyline, using first the one and afterward the other. The eosine solution consists of 38 grains of eosine dissolved in 1 ounce of rectified spirit and  $2\frac{1}{2}$  ounces of distilled water. The cover-glass is allowed to swim in this fluid for one hour. It is then removed and allowed to dry. It is now washed with a

mixture of one part of alcohol and two parts of water, and is dipped in the hæmatoxyline solution. This solution is made according to the Friedländer formula or to Böhmer's formula. Friedländer's is hæmatoxyline 2 parts, absolute alcohol 100 parts, distilled water 100 parts, glycerine 100 parts, alum 2 parts. The solution should be preserved in a dark place. If the cover-glass with dried spermatozoa is allowed to remain sufficiently long (a few minutes to a few hours) in either of these fluids, a characteristic and beautiful double staining is finally obtained. While the hinder part of the head of the spermatozoa is stained dark-blue, the forepart of the head, the middle piece, and the tail are stained deep red, as are all other parts of the preparation, except cell nuclei, which are blue. The addition of 1 drop of acetic acid to 1 ounce of the hæmatoxyline solution, will largely prevent overstaining with that reagent.

Besides this combination of staining reagents, the author has tried others, of which he gives details, but none is so perfect as that described, for example, a combination of carmine-alum and eosine, or of vesuvine and eosine.

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#### DETECTION OF PHOSPHORUS IN A BODY THREE MONTHS AFTER DEATH.

POLECK (*Vierteljahrsschrift für gerichtliche Medicin*, N. F., Bd. xlv. S. 286-297, and Bd. xlvii. S. 41-55, 1887) gives the details of a case of phosphorus poisoning, in which the feature of chief interest was the detection of the poison in the exhumed corpse three months after death. The case was that of a man who had been poisoned by his wife. They had been on the worst of terms for some time previously. After a midday meal of flesh, meal sauce, etc., prepared by his wife, and not shared as usual by her, the husband was, toward evening, suddenly seized with a violent convulsion, and became almost completely unconscious. After an hour he recovered. Next day he was very ill, suffering from occasional convulsions, violent diarrhœa, and involuntary passage of urine and fecès. In spite of this no doctor was called in. The man died on the fourth day. His wife was at once suspected by the neighbors of having poisoned him, but as the doctor who was asked to examine the body, certified, from an external examination, that the man had died of cerebral apoplexy, no further step was taken at the time by the criminal authorities, and the body was buried. But as suspicion still existed, and became gradually stronger, the body was exhumed three months after death, and a complete examination was made—the pathological by Professor Friedberg, and the chemical by Dr. Poleck. No free phosphorus was found in the body, but phosphorous acid was met with in the alimentary canal, and in the tissues generally. As phosphorous acid is not a normal constituent of the body, Poleck concludes that the most reasonable, and almost the sole explanation of its existence, is that it was due to the partial oxidation of phosphorus. A trace of arsenic and antimony was also found. This was of interest, as some mice poison found in the possession of the accused woman, which consisted largely of free phosphorus, contained a trace of arsenic and antimony.

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#### TOXICITY OF ACETYLENE.

J. OGIER (*Annal. d'Hyg. Publ.*, sér. 3, t. xvii. pp. 454-456, 1887), read a report on the toxicity of acetylene, at a recent meeting of the Société de



Médecine légale de France. The report is of interest, as acetylene is a gas which is largely produced in the imperfect combustion of carbonaceous material, and is an important constituent of coal gas. The report especially deals with the experiments of M. Brociner, who tested the action of acetylene on blood, and caused certain animals to inhale various mixtures of acetylene gas with air or oxygen. The conclusions arrived at are the following: 1. Blood charged with acetylene exhibits no characteristic appearance spectroscopically. 2. If any combination is formed of acetylene and hæmoglobin, it is very unstable. 3. Acetylene is not sensibly toxic by itself, and in this respect resembles other members of the same chemical group, as propylene.

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## PUBLIC HEALTH.

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UNDER THE CHARGE OF

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### MILK INFECTION.

In the January number of the present year, account was given of Dr. Klein's investigation into the relations between human scarlatina and a disease of the cow, which had been shown by Mr. W. H. Power to be its cause. Dr. Klein has since continued his study of these relations, and has presented to the Royal Society a paper on the subject, from which the following is extracted. (*Proceedings of the Royal Society*, vol. xlii.)

Dr. Klein had previously shown that certain suspected cows, on a farm at Hendon, had besides a skin disease—consisting of ulcers on the udder and teats, and in sores and scurvy patches and loss of hair in different parts of the skin—also a general disease of the viscera, notably the lungs, liver, spleen, and kidney, which resembled the disease of these organs in acute cases of human scarlatina. He had further shown that the diseased tissues of the ulcers on the teats and udder, produced on inoculation into the skin of calves a similar local disease, which in its incubation and general anatomical characters, proved identical with the ulceration of the cow, and further, that from the ulcers of the cow a species of micrococcus was isolated by cultivation in artificial nutritive media, which microorganism in its mode of growth on nutritive gelatine, on agar-agar mixture, on blood serum, in broth, and in milk, proves very peculiar and different from other species of micrococci hitherto examined. With such cultivation of the micrococcus he had produced by subcutaneous inoculation in calves a disease, which in its cutaneous and visceral lesions (lung, liver, spleen, and kidney) bears a very close resemblance both to the disease which was observed in the Hendon cows, as well as to human scarlatina.

More recently in examining acute cases of scarlatina, Dr. Klein found that

there is present in the blood of the general circulation a species of micrococcus, which on cultivation in nutritive gelatine, agar-agar mixture, blood serum, and other media, proved to be in every respect identical with that obtained from the Hendon cows. Out of eleven acute cases of scarlatina examined in this direction, four yielded positive results, three were acute cases between the third and sixth day of illness, with high fever and temperature, and the fourth was a case of death from scarlatina on the sixth day. In all these four cases several drops of blood were used after the customary methods and under the required precautions for establishing cultivations in a series of tubes containing sterilized nutritive gelatine, and generally only a very small number of these tubes revealed after an incubation of several days, one or two colonies of the micrococcus.

Having ascertained the identity in morphological and cultural respects of the micrococcus of the blood of human scarlatina with the organism obtained from the Hendon cows, the action of the cultivations of both these sets of micrococci was then tested on animals, and the results compared. It was found that mice—wild mice better than tame ones—on inoculation, as well as feeding, became affected in exactly the same manner, no matter whether the one set of cultivations or the other was used. The great majority of these animals died after between seven or twenty days. The post-mortem examination revealed great congestion of the lungs, amounting in some cases to consolidation of portions of the organ, congestion of the liver, congestion and swelling of the spleen, great congestion and general disease of the cortical part of the kidney. From the blood of these animals, taken directly from the heart, cultivations were established in nutritive gelatine, and hereby the existence of the same species of micrococci was revealed; they possessed all those special characters distinguishing cultivations of the micrococcus, of the Hendon cows, and of the human scarlatina.

In the third and concluding section of the work, cultivations of the micrococcus of two cases of human scarlatina were used for infecting calves; two calves were inoculated and two were fed from each set of cultivations; all eight animals developed disease, both cutaneous and visceral, identical to that produced in the calves that had been last year infected with the micrococcus from the Hendon cows. From the heart's blood of calves thus infected from human scarlatina the same micrococcus was recovered by cultivation, possessing all the characters shown by the cultures of the micrococcus of the Hendon cows and of the cases of human scarlatina.

MR. WILLIAM BROWN, F.R.C.S., Medical Officer of Health for Carlisle, relates in *The Sanitary Record* for July, 1887, an account of an outbreak of typhoid fever in Carlisle, in which milk was the vehicle of infection, and where typhoid fever in the inmates of the dairy was associated with an infectious fever in the cow. The point of interest in the paper is that the cases occurred at a time when the dairy was believed to be free from infection, but when the cows were suffering from a febrile malady. Mr. Dawson, a veterinary surgeon, who had examined the animals, stated that "the diseases from which the cows suffered were all more or less of a febrile character, associated with indigestion and occasionally with slight cough; the pulse of the affected

animals was increased in volume, and varied from 60 to 80 beats per minute, the normal pulse of the ox being from 40 to 45 per minute. The nose was hot and dry, and the horns were alternately hot and cold. There was very marked lumbar tenderness, which was very characteristic in all the sick animals. There was slight abdominal breathing from febrile condition. Constipation was generally present, but not serious. There were only two cases of purging; but in one case the purging was very great; the motions of a frothy character. Some of the animals were very ill, so much so that the dairyman on one occasion feared that one of them would die." Mr. Dawson had some cattle presenting similar symptoms, but such a number of consecutive cases of this nature in the same shed, and extending over such a lengthened period, viz., four years, was to him a new experience.

DR. W. J. SIMPSON, Medical Officer of Health for Calcutta, published in the *Indian Medical Gazette* for May, 1887, an investigation into an outbreak of cholera which occurred on board a sailing vessel, the "Ardenclutha," while lying in the port of Calcutta. It was discovered that ten men obtained milk daily from a native; of these, nine were attacked with illness, four had cholera and died, and five had severe diarrhoea. Only one man who drank the milk escaped, and he had only a very small quantity; while eight men who used preserved milk, and three who drank none at all were not affected. The cow from which the milk was taken was in good health, but the native admitted that his milk contained twenty-five per cent. of water drawn from a tank near his house; and it was also ascertained that some of his neighbors suffered from cholera. The dejecta from an imported case drained into the tank, and the patient's clothes were washed in it. As soon as the milk was stopped no cases occurred on board the vessel, though one person living near the tank was attacked two days later.

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#### ANIMAL LYMPH IN BERLIN.

IN Berlin, in the Imperial Vaccination Institute, during the latter half of 1885 all vaccinations were performed with animal lymph, two months being devoted to experiments with humanized and animal lymph, and to obtaining all information concerning the process of vaccination. During the months August to December, 1885, there were 959 primary vaccinations, with 98 per cent. personal, and 68 per cent. insertion success; and 738 revaccinations, in which the personal success was 82 per cent. and the insertion success 50 per cent. In addition, 450 tubes were sent to medical men, with the result that of 511 primary vaccinations, the success was 99 per cent. personal and 78 per cent. insertion success; and of 337 school children who were revaccinated, the personal success was 97 per cent., and 70 per cent. insertion success.

The method of vaccinating was to use perfectly fresh lymph, and to insert it by longitudinal incisions for primary vaccinations, and to use older lymph in scratches for revaccination.

The lymph was obtained from animals in the Imperial Veterinary School; there is a large place for special animals, which is of an even temperature in winter and summer.

The cost in Berlin of cultivating animal lymph is great; it amounts to about



fifty marks (about ten dollars) per animal, but then it must be taken into consideration that the veterinary school is outside of the town, and the animals must be brought into the town to be vaccinated, and taken out again.

Retro-vaccination was practised on the animal, the incisions were deep all over the abdomen, and lymph was taken five times after twenty-four hours. Only the upper layer of lymph was free from blood, but the blood could always be removed without injury to the lymph by the use of distilled water which had been previously boiled. The glycerine emulsion was the preparation most used, because it was found that decomposition did not set in whenever glycerine was mixed with the lymph, and experiments were made in which lymph was kept for over a year, and success attained with it when employed for vaccination.

Although the immediate results of animal vaccination were relatively favorable, yet in the end it led to a diminished insertion success, because, on the seventh day, when lymph is to be taken from children vaccinated with calf lymph, the vesicles are often undeveloped and small,<sup>1</sup> and little can be obtained, and the use of this is attended by less satisfactory results. Dr. Schulz comments on the difficulty of taking lymph entirely free from blood from restless children, and observes that the method adopted in Berlin was to mix the vaccine obtained from each child with glycerine, put it into tubes, which were then stood upright until the blood had sunk to the lower end of the tube, which could then be broken off and sealed.

Experiments were also, during 1885 and 1886, carried on at the Berlin Vaccination Station, in order to obtain, if possible, pure lymph free from all foreign bacteria. Animal lymph contains many germs which are not necessary for the production of vesicles, whereas humanized lymph is at times almost entirely free from them when cultivated on meat peptone gelatine. Different kinds of humanized lymph, therefore, were sown in small quantities of gelatine, and wherever colonies developed they were removed from the gelatine, until after eight days only those portions of gelatine remained which contained no germs; this was then used for vaccination, but in a very small number of cases was there any result, even when the experiment was tried with agar-agar mixture, and it was probably due to the dilution of the lymph in the cultivating media.

Dr. Schulz, therefore, says that until further experiments have been made, there is no means for preventing germs from entering animal lymph, and that all that can be relied upon is cleanliness in vaccination, and in taking lymph either from animals or children.—*Deutsche Vierteljahrsschrift f. öff. Gesundheitspflege*, Bd. xix. Heft 2, 1887.

<sup>1</sup> This statement is not in accord with the reports of the Medical Officer of the Local Government Board, England, on "The Animal Vaccine Establishment." (Twelfth Annual Report of the Local Government Board, Supplement containing the Report of the Medical Officer.)

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Two to five Didactic Lectures and two or more Clinical Lectures will be given each day by members of the Faculty. In addition to the ordinary clinics, *special clinical instruction, without additional expense*, will be given to the candidates for graduation during the latter part of the Regular Session. For this purpose the candidates will be divided into sections of twenty-five members each. All who desire to avail themselves of this valuable privilege must give in their names to the Dean during the first week. At these special clinics students will have excellent opportunities to make and verify diagnoses, and watch the effects of treatment. They will be held in the Wards of the Hospitals and at the Public and College Dispensaries.

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
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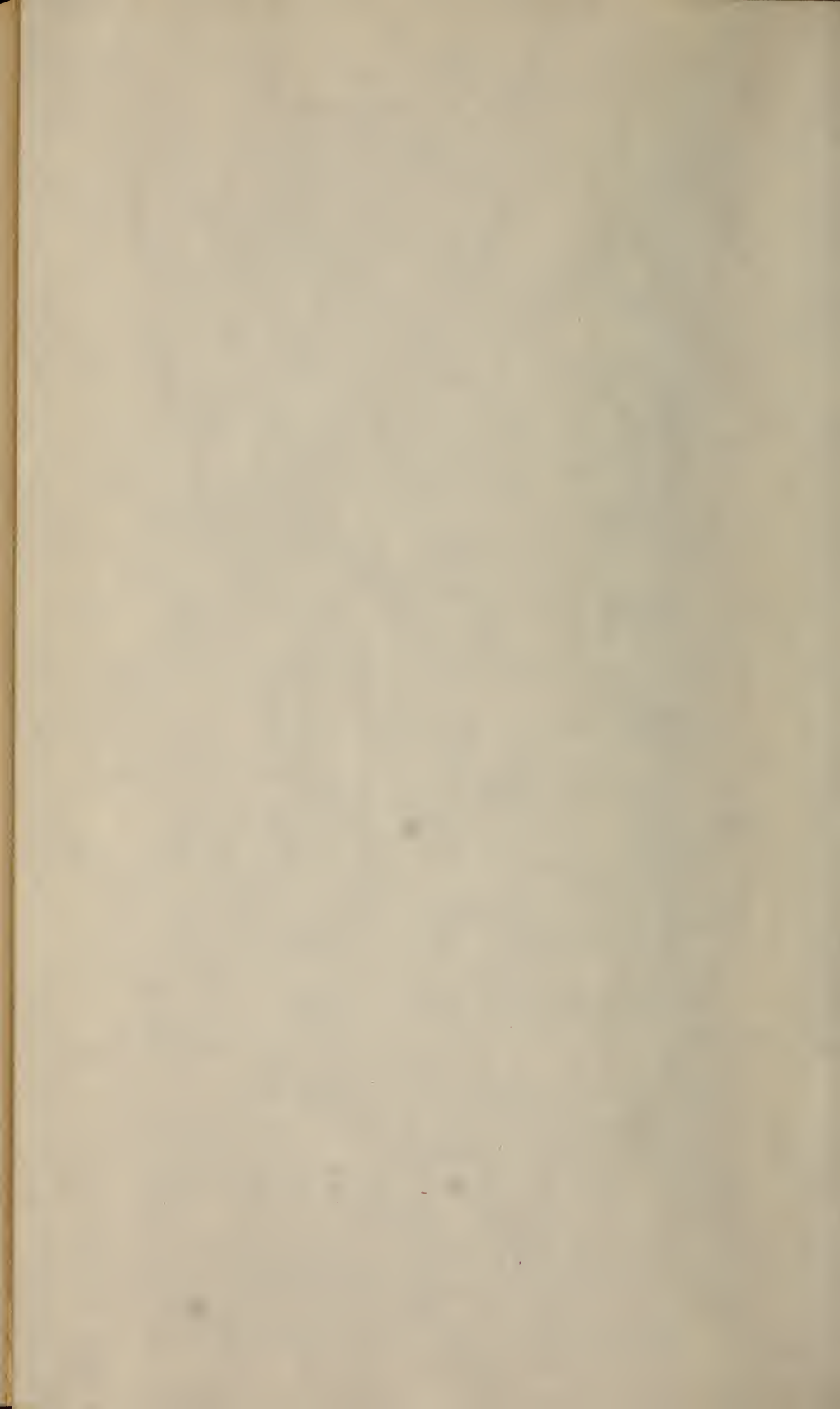
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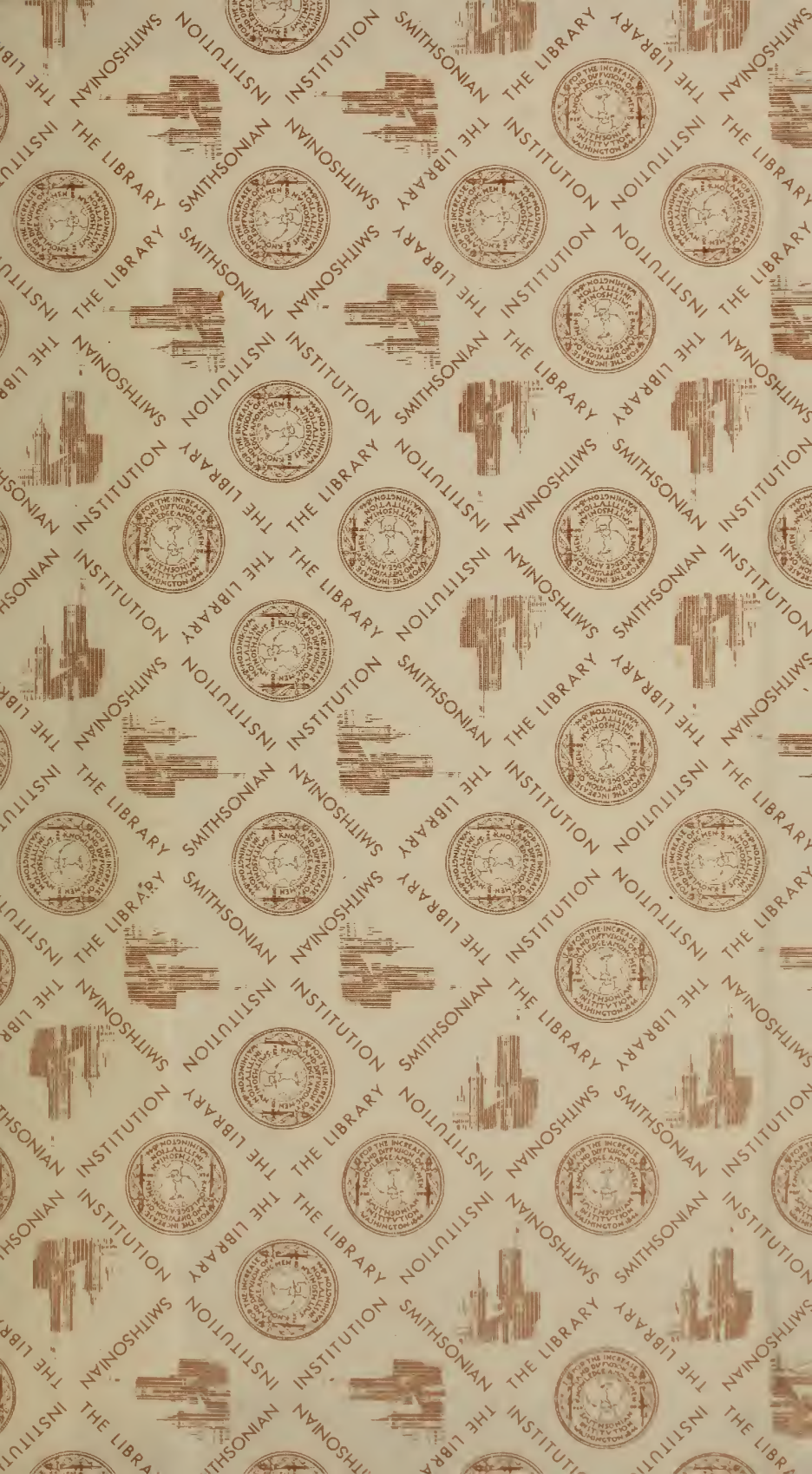














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